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USSR Report

ENERGY

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Moscow NEFTYANOYE KHOZYAYSTVO in Russian No 2, Feb 85 pp 57-58

[Article by Ye. K. Kozlova: "Decisions of the Oil Ministry's Scientific-Technical Council"]

[Text] In October 1984 the Oil and Gas Field Development Section of the Ministry of the Oil Industry's Council on Science and Technology met in Tomsk to discuss the subject "Experience Gained in Developing Oil Deposits with Low-Permeability Reservoirs." Participating in the discussion were leading specialists of a number of administrations, production associations and planning and scientific research organizations of the USSR ministries of the oil industry and of higher and specialized secondary education.

Among other things, the decision taken at the conclusion of this discussion pointed out that the current annual increases in commercial oil reserves and the growth in the volume of these reserves are due to the fact that we are bringing low-permeability reservoirs into development, most of which are concentrated in the Jurassic and Lower Cretaceous deposits of the fields in Western Siberia. The development of a highly efficient method of developing low-productivity reservoirs is therefore becoming increasingly important.

Organizations in a number of the country's oil-producing areas have accumulated a certain amount of practical experience in the development of this type of reservoir. In Tatariya, for example, experimental projects have been undertaken in attempts to intensify the development of low-permeability reservoirs in the Al'met'yevskaya area of the Romashkinskoye field. Studies have also been conducted in experimental sections of the Salymskoye field with the objective of developing a method of exploiting oil reservoirs in the Bazhenovskaya formation; the Meniliktov reservoirs in the Western Ukraine are being developed by injecting mixtures of water and gas. Methods have been tested in fields of the Northern Caucasus involving the injection of agents which mix with the oil into the low-permeability reservoirs; organizations in Tomsk Oblast have now gained some experience with the commercial development of low-productivity reservoirs in the Jurassic deposits with the use of the flooding method; SibNIINP and PermNIPIneft' have conducted their own tests and proposed and tested new methods and technologies designed to tap and develop low-permeability formations under specific geological conditions.

At the same time, however, the industry's scientific research institutes have failed to come forward with new engineering solutions which would contribute to efforts to

intensify the development process, while the approved methods, unfortunately, have yet to find any extensive application, having frequently failed to get beyond the pilot-project stage.

To increase the efficiency with which we are developing our low-permeability reservoirs, discussion participants adopted the following recommendations.

1. Scientific research institutes and production associations should make more extensive use of approved methods of formation development, develop fundamentally new engineering solutions, adhere strictly to the design and engineering guidelines governing well operations and complete field construction projects on schedule, to include the introduction of established planning and engineering solutions.

2. To provide more reliable data in support of organizations responsible for planning the development of reservoirs with low-productivity pools, pilot projects should be undertaken in the priority areas of a field which would include the application of a variety of methods and systems.

3. Scientific research institutes should be given the task of analyzing and correlating the results of theoretical and experimental studies and the experience which has been gained to date in the development of low-productivity oil reservoirs and on this basis the additional task of developing a theory and methods of planning the development of oil fields with low-permeability reservoirs.

4. Together with SibNIINP, Ukrgipronilneft', AzNIPIneft' and KazNIPIneft', our scientific research institutes should be working on a system of classification for low-productivity reservoirs and a standardized method of determining the filtration characteristics of low-permeability rock under conditions approximating actual formation conditions.

The recommendations adopted the conclusion of this discussion will help improve the efficiency with which we are able to develop our oil deposits with low-permeability reservoirs, which will make it possible to increase production from our oil reserves.

8963
CSO: 1822/204

OIL AND GAS

UDC 622.276

OIL INDUSTRY PERFORMANCE IN 1984 REVIEWED

Moscow NEFTYANOYE KHOZYAYSTVO in Russian No 2, Feb 85 pp 10-12

[Article: "The Oil Industry in 1984"]

[Text] Our country has now entered the concluding year of the Eleventh-Five-Year-Plan period. The Soviet people through their selfless labors are preparing their salute to the 27th Congress of the CPSU; they unanimously support the peaceloving foreign policy and the scientifically based domestic policy of our party. This was confirmed once again by the nationwide approval shown the decisions of the October (1984) plenum of the CPSU Central Committee and the November 15, 1984 decision of the CPSU Central Committee Politburo concerning the draft state plan for the economic and social development of the USSR and the USSR state budget for 1985 as well as the theses and conclusions contained in the speeches of Comrade K. U. Chernenko, general secretary of the CPDU Central Committee and chairman of the Presidium of the USSR Supreme Soviet.

Last year, 1984, saw our country take major new step forward in its development, in increasing its economic and military strength and in the effort to improve the material and cultural standard of living of the Soviet people and in the process achieve rates of economic growth substantially higher than those we saw during the first years of the Eleventh Five-Year-Plan period.

Oil industry workers are making a definite contribution to the country's economic growth. Not only meeting their annual targets, but fulfilling their counterplans as well, the Tatneft', Yuganskneftegaz, Bashneft', Kuybyshevneft' and Grozneft' production associations were among those achieving the highest ratings in socialist competition.

Industry enterprises have been engaged in a major effort to increase our oil production capacities. They have brought 11,182 new oil wells on line, 1156 more than called for by the plan; some 2,160,000,000 m^3 of water have been injected into the producing formations as against the 2,008,000,000 m^3 in 1983; the volume of air injected rose 1.46-fold, the volume of gas 1.4-fold.

The industry continued its intensive effort to improve the utilization of our productive capacities, first and foremost our oil wells. With the objective of insuring more thorough exploitation of productive capacities, more than 5300 flowing wells were changed over to more intensive mechanized methods of operation, the operation of

downhole pumping equipment was optimized in 16,300 wells and work was done on 13,900 wells to stimulate the flow of oil into the bottom.

An extensive program of measures was implemented to continue introduction of the advanced gas-lift system of well operation along with the high-capacity submersible pumps. Last year saw the number of wells operating with electric centrifugal pumps and gas lift rise 14.8 per cent.

As a result of improvements in the organization of well construction, assimilation and installation operations, the number of wells in the assimilation phase after drilling dropped from 1.01 per cent in 1983 to 0.74 per cent in 1984.

Improvements have also been made in the quality of oil preparation in the field.

Pursuant to decisions of the 27th Congress of the CPSU, a major effort has been undertaken to increase the degree of petroleum gas utlization, which has raised this indicator to 74.6 per cent as against 72.8 per cent for 1983.

Industry drilling organizations achieved their successes in 1984 as well. Last year saw them drill some 27.4 million m of producing and exploratory wells. As compared with 1983, drilling distance increased 1.7 million m or 6.5 per cent. Construction was completed on some 11,750 producing and 865 exploratory wells.

On the basis of equipment modernization programs, improvements in technology and better organization of well construction operations, drilling organizations, in fulfillment of party decision, achieved substantial improvement in their technical-economic performance indicators. In 1984, for example, the overall drilling rate in development drilling reached 100.1 per cent of the rate achieved in 1983, while the average length of time required to bring a producing well on line decreased 1.7 per cent.

Geological exploration by enterprises of the ministry of the petroleum industry led to the discovery of several dozen new oil fields and deposits. The plan for increases in oil reserves was fulfilled, which has created the conditions necessary for stable development of the industry into the future.

Industry growth continued to rest on increases in capital construction. As compared with 1983, capital investment was up 1.8 per cent, to include a 6.5-per cent increase in construction and installation operations. Additions to fixed capital totalled some 7.75 billion rubles.

The past year has seen the industry give particular attention to development of the West Siberian oil- and gas-producing region. Oil production in Glavtyumenneftegaz reached 61.7 per cent of overall production of oil with gas condensate within the ministry of the oil industry. Drilling operations were up 9.8 per cent for the year, reaching a total of 15.7 million m. Over half of the ministry's drilling operations and capital investment is concentrated on the development of oil production in this region. A major effort has been undertaken in Western Siberia to build and repair hard-surface highways providing continuous, year-round road transport links with the oil fields there. Personnel of the Tatneft', Bashneft', Kuybyshevneft' and other associations have provided the Siberians a great deal of assistance in equipping and operating their fields. The shift-shipment [vakhtovo-ekspeditsionnyy] method continued to find more extensive application in both drilling and production operations in

this region. September 1984 saw Glavtyumenneftegaz workers bring up the 3-billionth ton of oil recovered here since production began in the region.

Industry work collectives here took a series of steps designed to improve the operation of the economic mechanism and promote more extensive introduction of progressive forms of work organization and incentives based on final work results.

The past year has also seen the continuation of a major program of construction of housing and cultural and personal services facilities, improvements in working conditions and work safety and of the development of networks of children's preschools and public dining enterprises. Some 1,486,000 m^2 of residental housing space was made available in 1984, which includes 792,000 m^2 in Western Siberia.

These successes come as the result of the creative labors of a large number of oil industry workers, extensive socialist competition, widespread adoption of new ideas and practices from the top performers and exchanges of experience. They also reflect the intensive organizational efforts of party, soviet, industry, trade union and Komsomol organizations, as well as the labors of workers in the allied industries supporting the gas- and oil-producing complex with equipment, technology and materials and building housing and production, social and cultural and personal services facilities for oil-industry workers.

The watchword for the past year has been maximum economy and efficient utilization of manpower, material and financial resources.

Turning in a record of consistent, well-organized operations and fulfillment of assigned targets have been the Belozernett', Arlanneft' and Al'met'evneft' NGDU [oil- and gas-producing administrations], Surgutskoye UBR [drilling administration] No 2 and the Mirnenskoye, Aznakayevskoye and Tuymazinskoye UBR. Arlanneft''s oil field No 6 headed by A. T. Volkov and the brigades under foreman Z. M. Aminev of the Mamontovneft' NGDU achieved good results in their well operations. Closing out the year 1984 with a record of quality performance were the drilling brigades of foremen V. L. Sidoreyko, Yu. N. Gertner and A. A. Shukyurov of Surgutskoye UBR No 2, A. D. Shakshin of Nizhnevartovskoye UBR No 2 and T. G. Fattakhov of the Strezhevskoye UBR, which all exceeded the 100,000-meter drilling mark for the year. The top-rated drilling brigades, which work on the shift-shipment [vakhtovo-ekspeditsionnyy] basis, under foremen Yu. I. Abakumov, M. V. Bondarenko, V. I. Tsilibin and A. A. Martin of the Yershovskoye UBR and L. A. Nikishkin and P. A. Lebedev of the Mirnenskoye UBR, among others, have also turned in successful performances.

The initiative to drill 1 million meters in Western Siberia in 1985 launched by the Mirnenskoye UBR and endorsed by the collegium of the Ministry of the Oil Industry and the presidium of the central committee of the oil- and gas-industry workers' union is of particular importance.

Widespread socialist competition has developed within the industry with the objective of rendering a worthy salute to the 40th anniversary of the victory achieved by the Soviet people in the Great Patriotic War.

Among the initiators of this competition are the workers of the Nizhnevolzhsknett' Association, who have resolved to do 11 months of shock work in honor of the hero

cities and to meet their five-year oil-production target ahead of schedule, by the 68th anniversary of the Great October, and their well-drilling target by the end of 4.5 years. Workers of the Belorusneft' Association have undertaken the obligation to produce 3000 tons of oil and 500,000 m^3 of gas above plan by May 9, 1985. Having launched competition under the slogan "40 shock weeks in honor of the 40th anniversary of the victory," workers of the Bashneft' Association's Ishimbayneft' NGDU have resolved to raise their above-plan oil production since the beginning of the five-year-plan period to 55,000 tons by May 9, 1985. The initiative launched by the industry's leading performers has been endorsed and recommended for adoption by other organizations by the Ministry of the Oil Industry and the central committee of the oil- and gas-industry workers' union.

At the same time, we must now direct attention to the fact that industry performance in 1984 revealed some serious shortcomings. Most important were the oil-production targets not met by Glavtyumennefteqaz's Komineft', Gruzneft', Azenft' and Soyuztermneft' associations. These associations have yet to achieve maximum production levels at existing wells; the oil-production brigades, the basic link in the chain of production, must be organized on a sounder basis; field construction is not completed and the organizations are still behind schedule in converting their wells to more efficient methods of production.

A number of associations, NGDU and UBR have fallen behind schedule in the completion of oil field facilities, housing and cultural and personal services facilities.

Oil-industry workers face great challenges in this concluding year of the Eleventh Five-Year-Plan period. It is of particular importance that we make up the lag in oil production in a number of areas, first and foremost in Tyumen' Oblast.

The organizational and technical guidelines for implementation of the 1985 oil- and gas-production plan approved by the Ministry of the Oil Industry must be made the operational basis for all associations, enterprises and organizations.

To accomplish the challenging and critical tasks involved in continuing the development of our oil industry, each and every enterprises is going, on the basis of thoroughgoing analysis, to have to work to rectify deficiencies, in focusing on the objective of achieving all plan targets on a timely basis with the fullest, most efficient utilization of all production capacities and manpower, material and financial resources to identify and tap unexploited productive potential and on this basis to increase production efficiency and improve performance quality in accordance with decisions of the 26th Congress of the CPSU.

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OIL AND GAS

UDC 553.622.276.23/24

PROBLEMS IN INCREASING OIL RECOVERY LEVELS IN TIMANO-PECHORSKAYA

Moscow NEFTYANOYE KHOZYAYSTVO in Russian No 2, Feb 85 pp 19-23

[Article by Ye. F. Kreynin and A. R. Bench (Ukhtinskiy Institute of Industry), N. Sh. Khayredinov and V. V. Bashirov (UNI) and E. S. Petrov (GKNT): "Problems in Increasing Levels of Oil Recovery from Gas and Oil Reservoirs in Timano-Pechorskaya Province"]

[Text] The past decade has seen the share of oil recovered from gas-oil reservoirs in total production grow substantially, but to develop these reservoirs poses a difficult challenge. This is due on the one hand to the simultaneous occurrence in the reservoir of two mineral deposits (oil and gas) differing in physical characteristics and the conditions and extent of recovery from the porous medium and, on the other hand, to the geological nonuniformity of the producing formations.

The task of correlating the data available on gas-oil reservoirs which have been producing over long periods of time and identifying the basic field geological factors affecting the efficiency of efforts to develop these reservoirs is therefore one of some urgency.

The Nizhne-Omrinskoye field in the southern part of the Timano-Pechorskaya province comprises 13 reservoirs, in which formations Ia and Ib of the Pashiyskiy horizon are the primary producing formations. These reservoirs are distinguished by the presence of gas caps bordered by oil fringes of varying widths, hydrodynamic isolation and the absence of any edge-water drive. The producing horizons consist of arenaceous-aleurolite rock and are characterized by considerable lithological variation both over the section and the area of the field.

The reservoirs have broken down into two groups with respect to the characteristics of the shows of energy resources in the producing formation. Group I, which includes fields III, X and XIII of formation Ia and fields XIII and XVII of formation Ib of the Nizhne-Omrinskoye deposit, which has been characterized by an ineffective gas drive for as long as the field has been producing. This is due to the marked increase in the gas factor in the majority of producing wells, which in turn has decreased the productivity of these wells dramatically. Oil recovery from the reservoirs in this group is running at 0.13-0.20.

The group II reservoirs, which include fields XIV and XIX of formation Ia and fields III and XI and the Mezhomrinskaya area of formation Ib of Nizhne-Omrinskoye field, are characterized by effective utilization of the energy of the dissolved gas during

the early phase of development with a subsequent evolution into a gas-drive regime. The gas factor of most of the producing wells does not exceed 1000 m^3/t, which has resulted in an effective gas drive in the second and third stages of development. Oil recovery in the second group of reservoirs is running at 0.25-0.39. All the reservoirs we are looking at here have been developed in a uniform triangular pattern with wells some 350 m (for a network density of 10 ha/well) apart. The variety and specific nature of the manifestation of natural formation energy constitute a characteristic of the development of a gas-oil reservoir. Stage-by-stage geological analysis of the field has shown that a combination of gas regimes of varying effectiveness is characteristic of the reservoirs in both groups I and II. Gas drive was observed in the second and third stages of the development of the majority of reservoirs (see Table).

Table

Группа залежей (1)	Поле (2)	Пласт (3)	Коэффициент нефтеотдачи (4)	Стадии разработки (5)		
				Первая (6)	Вторая (7)	Третья (8)
I	X	Ia	0,196	РГ, НГ	НГ	РГ, НГ
	XIII	Ia	0,137	То же (10)	»	НГ
	XIII	Iб	0,130	»	»	НГ, НВ
	XVII	Iб	0,177	»	»	То же
	III	Ia	0,166	РГ	РГ, НГ	РГ, НГ
II	XIV	Ia	0,236	»	То же	РГ, НГ, НВ, ЗВ
	XI	Iб	0,250	»	»	НГ, НВ
	Межомринская площадь (9)	Iб	0,221	»	НГ, НВ	НГ, НВ, ЗВ
	XIX	Ia	0,392	»	РГ, НГ	То же
	III	Iб	0,363	»	То же	»

Note. РГ, НГ, НВ - solution gas drive, ineffective gas drive and inactive gas drive respectively. ЗВ - water injected into formation.

KEY: 1 - reservoir group; 2 - field; 3 - formation; 4 - oil-recovery factor; 5 - stage of development; 6 - first; 7 - second; 8 - third; 9 - Mezhomrinskaya area; 10 - same.

The dynamics of the mean formation gas factors (Figure 1) is evidence of the broad limits within which this factor varies during the process of development. High gas factors, for example, are characteristic of the reservoirs in group I, while low gas factors (up to 1000 m^3/t) are characteristic of group II. One of the basic indicators distinguishing the two groups of reservoirs is the number of rows of producing wells n drilled along the gas-oil contact. It depends upon the width of the oil fringe and the distance between the wells.

The fringes in the group I reservoirs have been developed in one to four rows of wells, the fringes in group II in three to six rows. The mechanism by which the gas cap acts upon the reservoirs in the two groups differs substantially (Figure 2). In the case of the reservoirs in group I, for example, more than 50 per cent of the wells operate over the entire period with gas factors above 1000 m^3/t. At the same time,

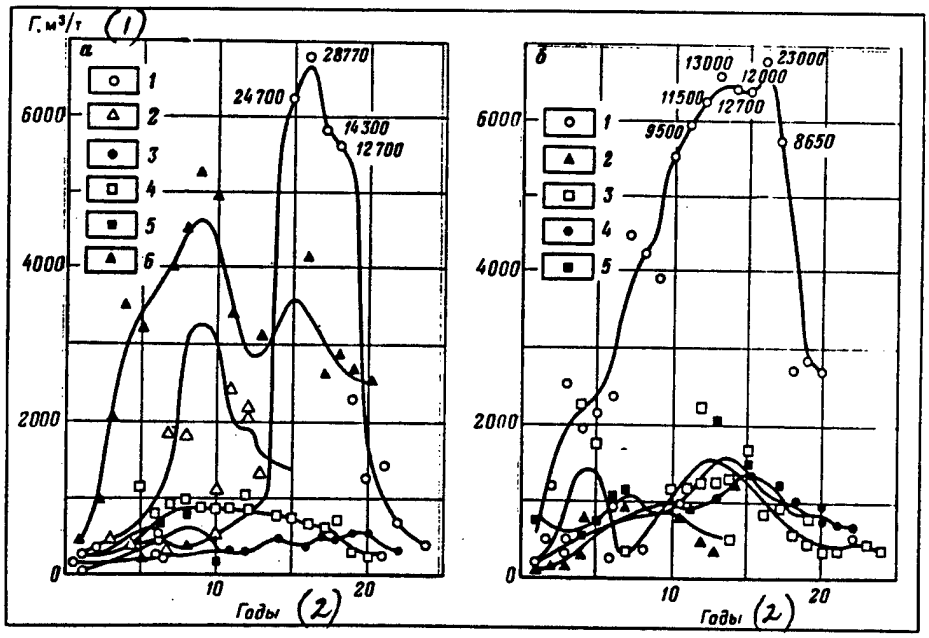

Figure 1. Gas factor curves for reservoirs in the Nizhne-Omrinskoye field (figures indicate well numbers):

a - formation 1a: 1, 2, 3, 4, 5, 6 - fields III, X, I, XIX, XIV, XIII respectively;
b - formation 1b: 1, 3, 4, 5 - fields XIII, III, XI, XVII respectively; 2 - Mezhomrinskaya area

1 - G (gas factor), m^3/t; 2 - years

the gas factors for virtually all wells in group II reservoirs remained below 1000 m^3/t during the entire period of development.

The nature of the effect of the gas cap on the oil fringe in the Nizhne-Omrinskoye field is and, accordingly, the oil recovery factor are therefore linear functions of the number of rows of producing wells.

The significance of the differences between the groups of reservoirs with respect to the number of rows of producing wells has been established by application of the nonparametric Wilcoxon criterion.* In the case of three or more rows, the reservoirs belong to group II. Accordingly, a reservoir will be developed with the most effective gas drive when an oil fringe of any width is worked by three or more rows of producing wells.

* I. Ye. Komarov. "Nakopleniye i obrabotka informatsii pri inzhenerno-geologicheskikh issledovaniyakh" [Collecting and Analyzing Information for Geological Engineering Studies], Moscow, Nedra, 1972.

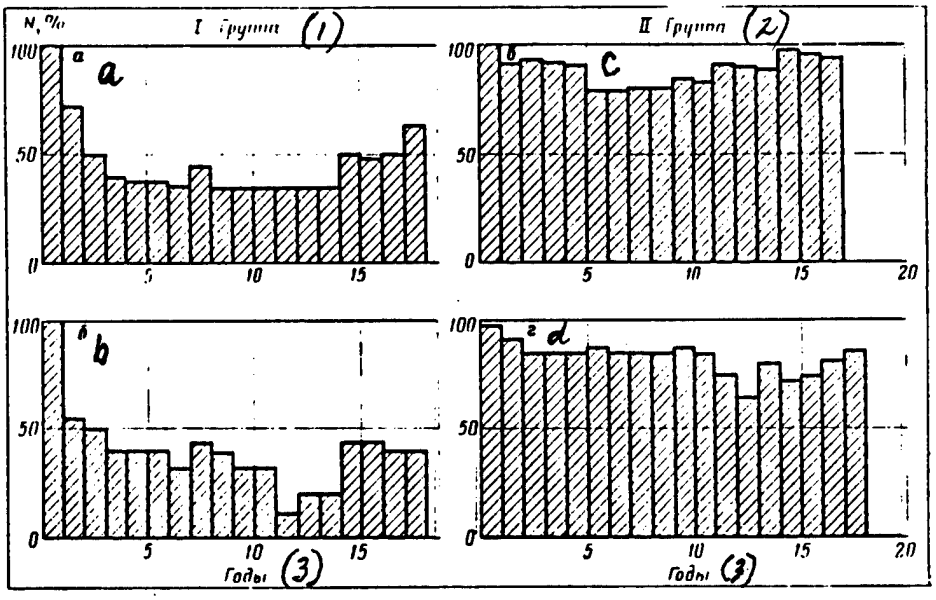

Figure 2. Variation in number of wells N (in per cent of total number of producing wells operating with gas factors below 1000 m^3/t with respect to years of development: a, b - Group I, formation 1a reservoir, fields XIII and XIX respectively; c, d - Group II, formation 1b reservoir, fields XIII and XI respectively. 1 - Group I; 2 - Group II; 3 - years.

The relationships for gas factor Γ as a function of current formation pressure $p_{пл}$ (Figure 3)

$$\Gamma = -34p_{пл}^2 + 190p_{пл} + 628 \tag{1}$$

and oil recovery η as a function of $p_{пл}$ (Figure 4)

$$\eta = -0.051\ p_{пл} + 0.4 \tag{2}$$

make it possible to estimate the total volumes of oil and gas at any stage of development with pressure reduced by Δp.

The material balance equation for gas with pressure reduced by Δp takes the form

$$\frac{V_1 + V_2}{Q_0 \Delta\eta} = \frac{V_0}{Q_0 \Delta\eta} + \frac{V}{Q_0 \Delta\eta} = \tag{3}$$

$$= \Gamma_p = \Gamma_0 + \frac{V}{Q_0 \Delta\eta}.$$

where V_1, V_2 and V_0 represent the volumes of gas penetrating the oil fringe from the gas cap, released from the oil and produced by operating a well under optimum conditions respectively; V the volume of gas in excess or lacking for the well to function under optimum conditions; Q_0 initial oil reserves; $\Delta\eta$ the increase in oil recovery and Γ_p and Γ_o, respectively, the actual and optimum gas factors.

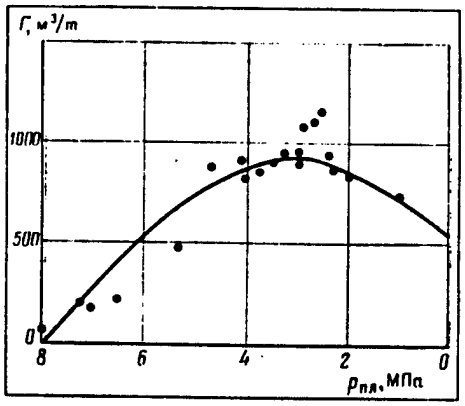

Figure 3. Mean reservoir gas factor Γ as a function of current formation pressure $p_{пл}$.

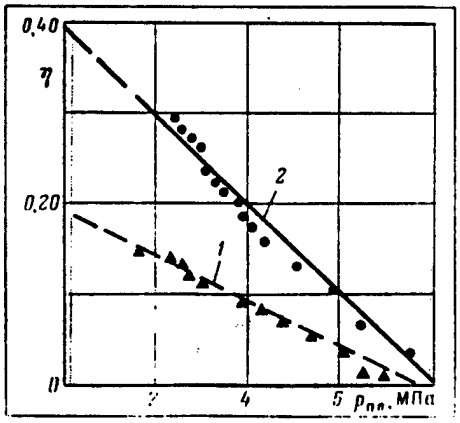

Figure 4. Oil recovery η as a function of $p_{пл}$ for reservoir groups I (1) and II (2).

After transformation taking account of equations (1) and (2) we obtain

$$V = \left(-34p_{пл}^2 + 190p_{пл} + 628 - \Gamma_o Q_0 \times \right.$$
$$\left. \times [-0.051(p_2 - p_1)]\right. \quad (4)$$

where p_1 and p_2 represent current pressures.

Equation (4) enables us to compute the volume of gas which must be removed from or injected into a gas cap to permit the development of a reservoir with an effective gas drive as well as to evaluate the energy state at any stage of the operation and to control the process of development. A minus sign preceding the V means that gas must be injected into the gas cap, a plus sign that gas must be withdrawn.

Equations (1) and (2) enable us to forecast the volume of gas produced as a function of formation pressure in accordance with formula

$$V_{нак} = \sum \Gamma_{pi} Q_0 (-0.051 \Delta p_i). \quad (5)$$

Comparison of the computed $V_{нак}$ with the initial reserves of free and dissolved gas makes it possible to estimate the potential reserve of energy in the gas cap and the dissolved gas. The following variants are possible.

1. Gas reserves are less than computed $V_{нак}$. In this case, gas must be injected into the formation to permit gas-drive well operation.

2. Gas reserves equal $V_{нак}$, that is, the gas in the cap is sufficient to permit development of the reservoir with gas drive throughout the entire period of operation.

3. Gas reserves considerably exceed $V_{нак}$. In this instance we can remove a certain volume of free gas directly from the gas cap.

The volume of free gas which can be removed or which must be injected into the gas cap is computed in accordance with the formula

$$\Delta V_{с.г} = V_{ос.г} + V_{ор.г} - V_{нак}. \quad (6)$$

where $V_{0_{с.г}}$ and $V_{0_{р.г}}$ represent the initial reserves of free and dissolved gas respectively.

Free gas can be removed from the gas cap provided that the oil fringe is worked at a faster rate.

Field geological analysis of the development of gas-oil reservoirs shows a considerable drop in gas cap energy as a result of inefficient utilization of the free gas over the period of operation in the reservoir. Intensification of the recovery of oil and gas from the oil fringe of these reservoirs will therefore require, in addition to the injection of water, the injection of dry gas into the gas cap and the marginal gas-oil zone as well as in-situ injection. Selection of the proper approach here will depend upon the ratio of the pore volumes of the gas and oil components of a reservoir, the width of the oil fringe, the ratio of formation pressures in the gas cap and the area of withdrawal as well as the geological nonuniformity of the producing formations. Creation of an effective gas-drive regime with controlled gas injection will make it possible to increase oil recovery.

8963
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OIL AND GAS

UDC 622.276.8:665.662

FULLER UTILIZATION OF PETROLEUM GAS URGED

Moscow NEFTYANOYE KHOZYAYSTVO in Russian No 2, Feb 85 pp 3-6

[Article by T. S. Pipa, N. P. Ignin and V. P. Myakisheva (VNIPIgazpererabotka) and P. I. Kulakov (SevKavNIPIneft'): "Utilize Gas in the Final Stages of Separation More Fully"]

> [Text] "...there is a common task, which in our time must find its place on the agenda in all enterprises, in all industries, and that is the task of improving management, insuring more efficient use of resources and of working more productively. The task, in other words, of managing our national economy more efficiently."
>
> K. U. Chernenko

Maximum petroleum gas utilization in some of our oil- and gas-producing areas reaches 95-96 per cent. To increase this percentage will require substantial changes in the methods currently employed to collect and use low-pressure gas, that is, gas produced in the final stages of separation.

We can distinguish two basic periods in the development of a field. The first is characterized by comparatively high excess pressures, which make it possible to transport most of the petroleum gas to gas processing plants and other consumers without the use of compressors. The development of high-pressure oil- and gas-collection systems during this period permits fairly efficient utilization of petroleum gas resources with only minimal field engineering expenditures.

In the second period, when a field enters the late phase of its development, which is characterized by intensive invasion of the wells by water and substantial decreases in formation pressure, it will inevitably become necessary to reduce pressure in the collection system [1, 2] to maintain planned oil recovery levels. It becomes necessary during this period to build facilities in a field which will enable us to make efficient use of all petroleum gas resources. We can go in several directions at this point. We can build compressor stations to transport the gas, pump the gas-saturated oil, reduce pressure at the receiving gas processing plant or we can do a combination of these things.

Let us now take a look at the advantages and drawbacks to these approaches.

Compressor stations in a field permit maximum pressure reductions in the oil and gas collection and preparation system, the most efficient utilization of formation energy in extracting oil from a formation and substantial reductions (occasionally to the very minimum) in expenditures required to maintain formation pressure. In this instance, however, we are faced with the need for large-scale capital investment to finance the construction of these compressor stations and the complex facilities required to process the gas for transport. And then if the fields are dispersed to any great extent geographically we would have to build these facilities in individual fields or at least for groups of fields. This approach would also characteristically involve large outlays to cover operational expenses required to maintain these dispersed gas collection, processing and transport facilities. What is worthy of attention, however, is a variant of this approach involving the construction in an individual field or a group of fields of a complex of facilities incorporating a gas collection system, compressor stations to transport the gas, gas-lift recovery and injection of gas under high pressure back into a formation [3].

If we employ centrifugal pumps to move our gas-saturated oil we can simplify our complex of field facilities substantially. In this system, after undergoing the required processing the gas of the first stage of separation is transported to the gas-processing facility by utilizing available reservoir energy, while centrifugal pumps transfer the gas-saturated oil with gas from the final stages of separation to full separation points in the vicinity of the gas-processing facility. Separation pressure will be determined by conditions prevailing with noncompressorized delivery of the gas to the processing facility. When we pump the oil in the gas-saturated state we improve its rheological properties and facilitate movement of the oil [4].

Table 1

Gas-processing facility	Minimum intake pressure, MPa
Nizhnevartovskiy, Nos. 1-4	0.2-0.105
Belozernyy	0.15
Gnedintsevskiy	0.01
Belorusskiy	0.20
Groznenskiy	0.12
Voznesenskiy	0.15

Optimum separation pressure in the first stage should be achieved by maintaining the reservoir pressure in the deposits. This variant therefore presumes that this pressure is maintained. Under industrial operational conditions we have pumped gas-saturated oil at saturation pressures of 0.6-0.8 MPa and ratios of 10-15 m^3 of gas per ton of oil. The Grozneft' Association, for example, is pumping gas-saturated oil with centrifugal pumps at a saturation pressure of 0.7 MPa some 53 km from the Oktyabr'skoye field to the Yubileynaya separation facility near the Grozneft' gas processing facility. At the Yubileynaya facility the oil undergoes hot separation to become a product which is now quality-standardized with respect to vapor pressure, while the gas from the final stages of separation can be moved on for processing. Work is currently under way on a system which would move gas-saturated oil at saturation pressures of up to 2.5 MPa. The basic problem encountered here, however, is to maintain the life of the face seals of the centrifugal pumps.

Pressure in the first stage of separation depends substantially on the pressure at the intake of the gas-processing facility and the hydraulic resistance in the gas pipeline. Improvement of the process of prearing the gas for transport will accordingly be an important factor in reductions in pressure in the first stage of separation. This factor becomes particularly important in fields with high separation temperatures and exceptionally rugged terrain.

Table 2

Area	Pressure in final stages of separation, MPa	Content of C_{3+} in gas, kg/m^3	Gas density, kg/m^3
Nizhnevartovskiy	0.025-0.0105	0.351-0.770	0.957-1.279
	0.025-0.0105	0.653-1.368	1.192-1.697
Surgutskiy	0.025-0.0105	0.330-0.737	0.935-1.242
Belorusskiy gas works	0.03-0.005	0.374-1.161	0.778-1.119
Gnedintsevskiy works	0.0145-0.014	0.554-1.132	1.436-1.720
Groznenskiy works	0.0125-0.013	1.044-1.886	1.485-1.721
Voznesenskiy works	0.015	0.880	1.681

Maximum reduction of hydraulic resistance for noncompressorized gas transport and of pressure at the intake at the gas-processing facility (in the case of insufficient reservoir energy) will make it possible to increase the efficiency with which we can exploit our oil deposits because it permits more efficient utilization of reservoir energy, reductions in the amount of water injected into a formation, improvement in well flow conditions and utilization of a fraction of the gas energy to lift the fluid in compressorized gas lift.

Taking these considerations into account, SevKavNIPIneft' plans for its Neftekumskiy gas-processing facility call for the construction of compressor stations with intake pressures of 0.05 MPa, which will make it possible to increase the efficiency of the development of a number of fields in Stavropol'skiy Kray and the Dagestan ASSR. Reductions in pressure at the intakes of compressor stations located at the intakes of gas-processing facilities will also improve transport conditions for gas containing high levels of heavy hydrocarbons by reducing the condensation of these hydrocarbons and by preventing the formation of hydrates in the gas pipelines. It will also be possible then to utilize gas from the final stages of separation coming from separation facilities in the vicinity of the gas-processing works. Most of the country's gas-processing facilities have minimum intake pressures of 0.15-0.20 MPa (see Table 1), and the lack of any which can utilize gas at lower pressures results in the loss of 2-4 m^3 of gas per ton of oil produced. In the vicinity of the Groznenskiy, Nizhnevartovskiy and other gas-processing plants, for example, we have for a long time been forced simply to burn off any gas at pressures below 0.11 MPa.

Table 1 shows that the intake pressure at most all of our gas-processing facilities is above 0.105 MPa and that only at the Gnedintsevskiy works are we processing gas at pressures of 0.01 MPa, which permits full utilization of gas from the final stages of separation.

Table 3

Gas-processing works	Content of C_{3+} in gas, kg/m³		Gas density, kg/m³	
	planned	actual	planned	actual
Nizhnevartovskiy	0.321	0.250	0.970	0.871
Belozernyy	0.292	0.291	0.965	0.902
Gnedintsevskiy	1.200	0.529	2.190	1.205
Belorusskiy	0.382	0.427	1.160	1.270
Groznenskiy	0.430	0.139	1.142	0.901
Voznesenskiy	0.418	0.210	1.583	0.916

Utilization of gas from the final stages of separation is a most urgent objective in view of the fact that this gas contains many valuable hydrocarbon components. The content of the $C_{3+vyssh}$ fraction varies between 0.351 and 1.886 kg/m³ (see Table 2). From 1 billion m³ of gas we can extract 350,000-1,800,000 tons of the broad fraction of light hydrocarbons (unstable natural gasoline). This will yield an additional 105-540,000 rubles per billion m³ of processed gas.

Gas from the final stages of separation is flared off for the most part in fields which have no compressor stations to transport them and where intake pressure at the gas-processing facility is higher than 0.01 MPa. A number of our operational gas-processing facilities were designed on the basis of an intake pressure of 0.2 MPa, which made the possibility of using gas from the final stages of separation a doubtful one from the very beginning. In the case of some gas-processing works, the Groznenskiy facility, for example, not even a compressor station with an intake pressure of 0.05 MPa called for by the plans was built. The result has been that the Groznenskiy gas-processing works has not been able to achieve its planned performance levels.

Losses of gas from the final stages of separation also reduce the average density of the total volume of gas arriving at a facility for processing. The planned and actual content of $C_{3+vyssh\ [higher]}$ in gas arriving for processing shown in Table 3 indicates that the processing facility is receiving "leaner" gas than called for in the plans. This is a consequence of the fact that the plant is in fact receiving gas from only the first and second stages separation as opposed to whole gas as provided in the plans. To process gas from the final stages of separation is an important objective not only because we need to be making fuller use of our petroluem gas resources, but also because of the value of this step as an environmental protection measure.

We can achieve this objective only by adopting an integrated approach to the problem of increasing the efficiency with which we develop our fields, particularly during the late stages, with allowance now made, above all, for sharp increases in the degree of utilization of petroluem gas from the final stages of separation. This will require the implementation of a series of measures:

construction of compressor stations to handle gas from the final stages of separation in individual fields or for groups of fields (TsPS) [expansion unavailable] with the objective of combined transportation to the customer of gas from both the first and the final stages of separation;
transportation of gas-saturated oil to full-separation facilities located in the immediate vicinity of the gas-processing plants;
reduction of intake pressure at gas-processing facilities to 0.01 MPa (improving plant intake systems for pressurized gas).

The most effective approach in any given situation must be selected on the basis of thorough, integrated engineering-economic analysis.

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OIL AND GAS

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SOLUTIONS TO PROBLEM OF OIL-FIELD EQUIPMENT CORROSION DISCUSSED

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[Article by B. S. Lobanov and A. F. Magalimov (Tatneft') and I. G. Yusupov and M. M. Zagirov (TatNIPIneft'): "Basic Directions in the Fight against Oil Field Equipment Corrosion"]

[Text] The oil industry is one of our biggest consumers of metal. The oil field equipment and facilities in Tatneft' alone, for example, contain more than 5 million tons of metal. To maintain these facilities and equipment in good operating condition and extend service life are becoming particularly important to our national economy in view of the fact that, due to the highly corrosive effect of the material we pump, the service life of our oil field equipment is shorter than its depreciable life. Breakdowns of oil field equipment, moreover, harm the natural environment and negatively affect the oil recovery process.

The number one cause of oil field equipment failure is corrosion. In the oxygen-containing Devonian run-off water in the Tatneft' Association fields, for example, metal will corrode at rates of 0.5-1.5 mm/yr and 5 mm/yr and faster in the hydrogen sulfide water. The formation water in the fields of Tatariya is also highly corrosive; it corrodes the outer surface of a casing string at a rate of 0.5-1.1 mm/yr. At these rates of corrosion, the service life of oil field equipment will not exceed a few years.

Because the formation water brought up along with the oil is so corrosive and it must be recovered for further use in maintaining formation pressure, the problem of increasing the operational reliability of the pipeline transport system (the formation pressure maintenance system in particular) becomes especially acute.

The Tatneft' Association operates some 45,000 km of a number of types of pipeline, which, depending upon the effectiveness of the protective measures and the corrosiveness of the materials it is carrying, breaks with a widely varying specific frequency. The need for extensive employment of protective methods is therefore obvious.

The association has now accumulated a substantial fund of practical experience in the employment of methods of protecting various types of oil field equipment against corrosion, which makes it possible to evaluate the effectiveness of these methods and to outline ways to improve individual methods and technical solutions. Let us now take a look at the most important protective methods and their effectiveness.

The corrosion inhibitors IKB-4V, SNPKh 6011, ES-2 and a number of foreign reagents are finding extensive application. Generally speaking, however, they do not solve the problem of corrosion of pipeline systems and well equipment; rather, they simply extend somewhat the service life of this equipment.

Protective coatings applied to the surfaces of oil field equipment not only increase the operational reliability of this equipment and extend its service life several times, they also reduce hydraulic resistance and prevent the depositing of salts and the products of corrosion on the surface in contact with material moving through the line. The application of these coatings should accordingly be seen as the most important solution we now have to the problem of increasing the service life of equipment and formation pressure maintenance systems.

A great many different materials are used as protective coatings. Paints, varnishes, polymers, silicates, and metallic, ceramic and metal-ceramic materials are among the most commonly employed. Which coating will be most effective is chosen on the basis of the type of equipment involved, the operational conditions, the length of service desired and the process and equipment to be used in applying it. One of the greatest limitations on the use of pipe to which protective coating has been applied is that there is no way to join sections of pipe to build a pipline and still maintain the integrity of the coating.

On the basis of the large fund of practical experience which has now been accumulated in the operation of equipment to which different coatings have been applied and of the requirements outlined above, we are recommending the following methods of protecting oil field equipment.

To prevent the formation of paraffin deposits it is most advantageous to coat the oil well tubing with glass or other silicate material. These coatings, which offer high degrees of resistance to heat and chemicals, are effective with the application of thermal methods of producing oil or of increasing the productivity of a formation. Tatneft' has a tube glazing shop to apply glass coatings. TatNIPIneft' [Tatar State Oil Industry Scientific Research and Planning Institute] has developed an improved method of glazing oil well tubing, which is making it possible to improve the quality and durability of the coating and increase the efficiency with which we can use this tubing.

Epoxy resin-based polymer paint and varnish compounds are extensively employed in injection wells to protect well tubing against corrosion by the injection fluids. The association operates three facilities which apply these coatings. Protective coatings extend the service life of well tubing from five to seven years. The problem of the durability and air-tightness of the screw joints has not yet been completely solved, however,

Polymer powder coatings provide effective protection for the working parts of pumps pumping corrosive fluids. Two central operational maintenance facilities coat more than 200 pumps each year, which is making it possible to double their service life.

Despite the use of corrosion inhibitors and the employment of a number of methods designed to fight corrosion, the problem of providing effective corrosion protection for the pipeline system remains the most urgent and difficult. In the early 1970's

the Tatneft' Association would commonly coat its tubing with epoxy compounds in the field. It treated more than 600 km of tubing this way. Practical experience with the use of this tubing, however, showed that this process does not insure long-term failure-free operation of the pipeline coated by this method; it was therefore decided to build the association's own facilities and shops and treat the pipe here.

The engineering, scientific-technical and planning and design work undertaken by TatNIPIneft' has made it possible for the first time to move to the large-scale construction of special facilities for treating pipe with protective coatings using internal manpower. Tatneft' has decided to focus its next efforts in the battle against pipeline corrosion on lining 114-159-mm diameter lengths of metal pipe with polyethylene tubing and applying silicate (glass) coatings to tubing of up to 325 mm diameter. To implement these solutions TatNIPIneft' designed, built and since 1983 has been operating a special facility which can line pipe with polyethylene at rates of up to 300 km/yr and is now building two more facilities for glazing large-diameter pipe.

The most important advantage this polyethylene-lined pipe offers is that it combines the high resistance to corrosion of polyethylene and the great strength of the steel pipe. The institute has developed two methods of joining this kind of pipe as well as a process to be employed in building pipelines with it which involves crimping and then arc-welding the connections, both of which are now being successfully employed by the association's production enterprises. The range of application of polyethylene-lined pipe is limited by the temperature of the material (up to 70°C) and the chemical resistance of the polyethylene.

Table 1

Indicator	Pipe	
	polyethylene-lined	glazed
Designed facility capacity, km/year	300	300
Estimated cost of facility, mil/rub	3.0	2.48
Pipe diameter, mm	114-159	114-325
Material consumption, tons/year	700	2500
Coating application cost, rub/m	4.0	3.1
Thickness of coating, mm	up to 4	0.8-2.5
Working temperature, °C	up to 70	325
Life of coating, years	15	15
Method of connection	crimping or welding connection	welding
Annual savings, thous. rub/km	8-13	12-20

Glazed pipe may also be used to transport corrosive material within the oil-production industry. The process and the equipment required to apply the coating and connect the pipe in both the field and the indoor facility have been developed by TatNIPIneft', the silicate material by the State Glass Institute.

Table 1 shows the engineering-economic indicators for the use of pipe with protective coatings. Depending on the diameter of the pipe and the corrosiveness of the material it carries, it can yield annual economies of 8-20,000 rubles/km.

The association is making extensive use in its fields of an electrochemical method, one of the most effective, to protect casing strings and field pipelines against external corrosion. TatNIPIneft' has been able on the basis of many years of research to demonstrate the presence of intensive external corrosion of casing strings and the absence of any danger of soil corrosion of underground lines, so it has adopted an individualized system involving the application of protection to the casing strings only.

According to this system, one well or several wells located in the same general vicinity will be protected by a cathode device without any electrical disconnection of the flow lines from the wells. The average parameters of protection with reference to a single well are as follows: protective current (to include the use of part of the flow line current) - 12 A; distance between anode ground and wellhead - 30-50 m; length of vertical anode ground with carbon-graphite electrodes - no greater than 40 m. Assuming these parameters, the minimum current density at the most corrosive point at depths of 800-1000 m will be 14 mA/m^2, the degree of protection in the neighborhood of 60 per cent. To reduce the negative effect these protective currents have on other pipelines the anode grounds will be located at least 50 m away from them. Cathode protection was applied to some 3000 wells in the Romashkinskoye field over the period 1979-1983, the result of which was that the number of casing failures per year was cut in half or better.

The Tatneft' Association is also taking a number of steps to increase the operational reliability of its wells. Since corrosion is the number-one cause of the breakdown of casing seals, these measures, such as, for example, lifting the cement slurry in new wells, enlarging the cement ring in running wells and protecting the casing strings electrochemically, have also made it possible to solve the problem of reducing the rate of casing string failure over an entire oil-producing region. Table 2 summarizes the results achieved with the protection of oil-field facilities and shows the extent to which these measures have been applied.

In 1979 the association created a corrosion protection service to implement this program of anticorrosion solutions and observe their effectiveness. It comprises a corrosion and environmental protection department at association level, a department at TatNIPIneft' focusing on the problem of providing corrosion protection for oil-field equipment with five sections specializing in the different types of corrosion protection, corrosion laboratories in the TsNIPR [expansion unavailable] of all NGDU [oil- and gas-production administrations] and the field gas-collecting administration, an official (senior engineer) in the production departments of the NGDU charged with oversight responsibilities, four facilities in two NGDU and an UPTO and a KO [expansions unknown] responsible for coating the inner surfaces of well tubing, four sections in the NGDU responsible for coating the insides of storage tanks and two maintenance and contruction administrations, two sections in two centralized production maintenance facilities to coat pump parts, one facility to line pipe with polyethylene at the Al'met'yevskaya centralized oil-field equipment maintenance facility and four more facilities in four NGDU which are responsible for treating metal with anticorrosion coatings.

At the same time, however, all these steps the association has been taking to fight corrosion can still not be considered the final solution to the corrosion problem; they are only making the problem somewhat less acute. In our view it would be more appropriate and more efficient to coat the pipe during fabrication and to fabricate

Table 2

Surface protected	Method of protection	Extent solution implemented PA			Status of effort
		1983	1985	1990	
Formation pressure maintenance system:					
water lines	corrosion inhibitors, thous. tons	3.5	12	16	depends on availablity of corrosion inhibitors
	protective coatings, km/yr:				
	114-159-mm-diameter pipe lined with polyethylene	60	300	500	facilities operational
	114-325-mm pipe glazed	—	50	400-500	facilities under construction
pumps, working wheels	powders	238	250	300	two sections operational, existing requirements met
valving	same	10	500-700	up to 1000	plasma coating facilities under construction
Casing strings	cathode protection, no. wells	2700	3500	up to 4000	specialized section operational
Injection wells	combined protection against internal corrosion, number of wells	1200	1300	1500	—
Well tubing	inside coating, km/year	450	500	700	four facilities operational
Storage and settling tanks	polymer coatings, thous. m^2	12.6	30.0	30.0	specialized sections operational

pipeline-building equipment centrally by enterprises of the industries involved. Development of the process and equipment required to fabricate pipe with anticorrosion protection at existing production facilities will entail the development and fabrication in turn of large volumes of specially designed equipment. Large-scale implementation of any anticorrosion program will also require the creation of special planning and design organizations and pilot plants to fabricate the whole range of equipment these facilities will require.

Conclusions

1. The Tatneft' Association is currently engaged in a large-scale effort to improve the operational reliability of its formation pressure maintenance system and oil-field equipment. It has created a corrosion-protection service, is monitoring the progress of existing corrosion and has evaluated the effectiveness of the anticorrosion measures which have been taken.
2. TatNIPIneft' has conducted a major program of scientific research, planning and design with a view to building anticorrosion protection facilities, and on the basis of this research and development effort the Tatneft' Association is now building a number of installations, facilities and shops.
3. Methods of protecting oil-field equipment against corrosion by building special facilities for applying protective coatings can be introduced on a extensive scale by creating special planning and design organizations and pilot plants to design and fabricate the specialized equipment required.

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EFFECT OF WELL PATTERN DENSITY ON OIL RECOVERY IN ARLANSKOYE FIELD

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[Article by V. B. Sergeyev (NIPIgeolfizprom): "The Effect of Well Pattern Density on Recoveries of Oil from Oil-Water Zones of Reservoirs in the Arlanskoye Field"]

[Text] Hydrodynamic methods of analyzing field development show only a weak relationship between ultimate oil recovery and the density of the pattern of wells. This is true of both the purely oil-bearing zones and the water-oil zones of the reservoirs and can be explained by the fact that it is impossible to take account of the full range of characteristics of the actual formation and the fluids saturating it and the changes they undergo both before and during development. In mathematical models the formation will always be, to a certain extent, idealized.

Statistical computational models based on multifactor correlational analysis have established a link between oil recovery and a large number of field geological parameters. The coefficients of regression of these models, however, do not convey a sufficiently reliable idea of the effect of the factors they take into account on oil recovery in consequence of the correlation between the individual parameters. Moreover, they will usually use the mean values without regard to variations from object to object. These models are therefore always more uniform than the formations themselves, in consequence of which they will always to some extent obscure the true link between oil recovery and the density of the network of wells.

It is of practical interest to study oil recovery levels as a function of well network density directly on the basis of field data collected within the limits of the same reservoirs. The present article looks at the effect of the water-oil zone on the development of terrigenous deposits of the Lower Carboniferous and presents the results of increases in well pattern density in one of the oil-water reservoirs in these deposits in the Arlanskoye field.

The water-oil zones are confined to one of the major formations of terrigenous stratum C_{VI}, which is being developed together with the other sandy-aleurolite formations of this stratum (C_I-C_V) as a single object when they coincide in section. Formation C_{VI}, by comparison, is characterized by more favorable geological-physical properties, in more persistent in area and relatively more uniform.

Within the limits of the Arlanskaya area, for example, the Sattarov coefficient of this formation is 0.3, porosity 23 per cent, core permeability 1.58 μm^2, the initial oil saturation 87 per cent. The mean effective oil-saturated thickness of the formation in the primary oil zone is 5.4 m, 4.1 m in the water-oil zone.

Surface density, kg/m^3	891
Content, %:	
paraffin	1-4
sulfur	2-4
resin	14-20
asphaltenes	9
Gas content, m^3/t	17.7
Viscosity, mPa·s	18

The oil in formation C_{VI} differs only little from the oil found in the other formations and is characterized by the perperties shown in the table, left.

The viscosity of the formation water is 1.65 mPa·s.

The presence of an active water-drive system, which makes it possible to develop the water-oil zone with virtually no need to maintain formation pressure, is characteristic of formation C_{VI}. The water-oil zone contains more than half the oil reserves of formation C_{VI}. It is therefore this formation which determines the performance indicators for the object under development overall.

Table 1

№ участка (1)	Плотность сетки, 10^4 м²/скв. (2)	Текущая обводненность, % (3)	Накопленный ВНФ, $м^3/м^3$ (4)	Нефтеотдача, % (5)	Конечная нефтеотдача, % (6)
1	19.6	89.6	2.95	37.8	47.7
2	16.5	88.8	2.17	41.0	52.0
3	17.9	89.5	2.37	40.3	50.4
4	18.8	88.2	2.80	22.1	29.4
5	23.2	88.6	2.40	24.8	32.7
6	21.4	86.3	1.83	31.9	41.0
7	19.9	89.1	2.63	31.8	40.7
8	20.5	86.0	2.03	22.7	30.4

KEY: 1 - section number; 2 - network density; 3 - current water encroachment; 4 - - cumulative water-oil ratio, m^3/m^3; 5 - - oil recovery, %; 6 - oil recovery factor, %

Table 1 presents performance indicators for various producing sections, which differ with respect to the reserves of oil in the oil and water-oil zones, while Figure 1 shows the displacement curves for these sections.

We can see in Table 1 that with only a slight difference in current water encroachment, the oil recovery and cumulative water-oil ratio of the various sections will vary considerably. This is governed primarily by the fraction of oil reserves in the water-oil zone. Sections 2 and 3 exhibit the best development indicators. Oil recovery here exceeds 40 per cent with a relatively low water-oil ratio. The fraction of oil reserves in the water-oil zones is smallest in these sections, the displacement curves the most favorable. Sections 4, 5 and 8 exhibit the worst indices. Oil recovery here is only 22-25 per cent with a relatively high water-oil ratio. The proportion of oil reserves in the water-oil zones in these sections is greatest, the displacement curves the least favorable.

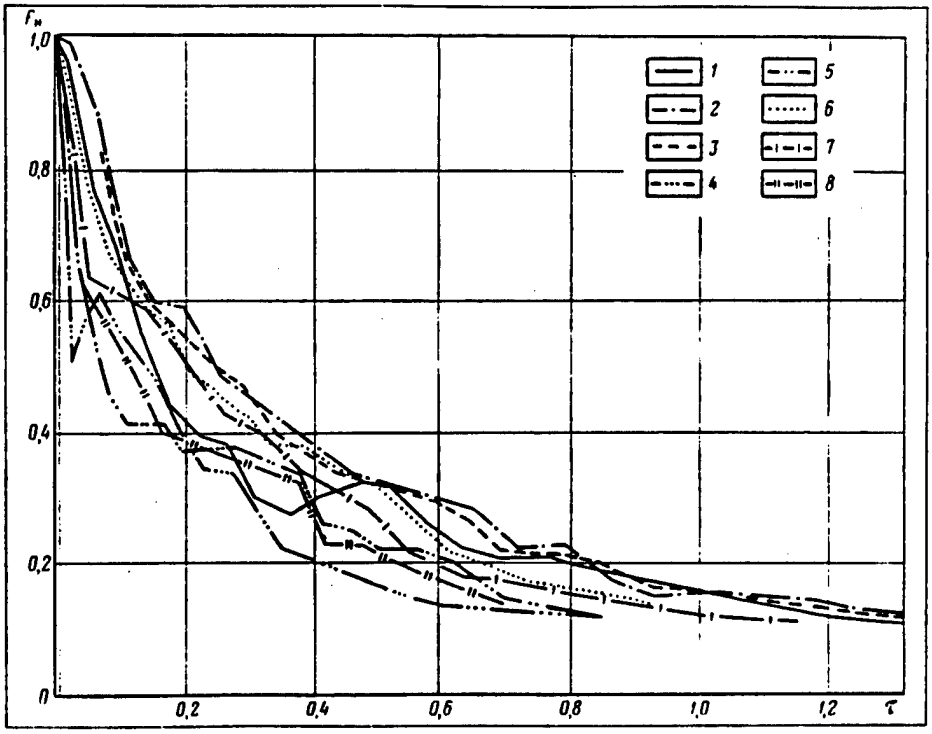

Figure 1. Displacement curves for producing sections in the Arlanskaya area: 1-8 - numbers of producing sections; $f_н$ - proportion of oil; τ - dimensionless time.

As compared with the purely oil reservoirs, the development of the water-oil zones is characterized by a slower rate of development, a brief water-free period and water-free production. This is due to a more intensive process of encroachment, which, in turn, is the result primarily of the formation of the cone.

We can see from Figure 1 that ultimate oil recovery levels in sections with a relatively high proportion of oil reserves in the water-oil zone are anticipated to be some 1.5-1.7 times lower with this system of development as compared with sections in which these zones are insignificant. To improve this water-oil zone indicator and intensify the pace of development, recent years have begun to see the drilling of infill wells.

Let us now take a look at the developmental indicators for one of these reservoirs, which is located in section 8 of the Arlanskaya area. The reservoir is confined to a relatively small rise extending slightly from west to east and underlain entirely by bottom water. The period of development of this reservoir, 1965-1966, saw two rows of wells drilled within the limits of the oil pool outline with 450 m between the wells in a row and 500 m between rows. The mean arenosity factor is roughly 0.5, the formation fragmentation factor 1.66.

Five wells from the basic stock (2017, 2018, 2029, 2121 and 2123) were brought into production which were characterized by an average oil saturation thickness of 7.5 m. The initial density of this pattern was 22.5 x 10^4 m^2/well. In wells 2169, 2367 and 1388 the formations with oil-saturation thicknesses of less than 3 m were not perforated.

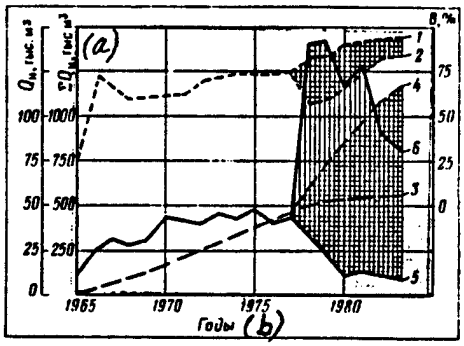

Figure 2. Dynamics of primary reservoir development indicators: 1, 2 - water encroachment B for basic and basic + infill well stock respectively; 3, 4 - cumulative oil recovery ΣQ_n for same well stock categories; 5, 6 - annual oil recovery Q_n for same well stock categories.

Wells of the basic stock began producing, in a flow regime as a rule, at rates of 8-79 t/day. Characteristic of these wells is the virtual absence of any water-free period and a sharp increase in water encroachment immediately in the initial stage. The early years of operation saw mean encroachment levels exceed 50 per cent. This made it necessary immediately to change these wells over to mechanized production.

In 1978 six infill wells (7630, 7631, 7632, 7633, 7634 and 7635) were drilled 250 m from one another between the rows of the basic stock. The density of the pattern was now at least doubled, reaching 10.2 x x 10^4 m^2/well. The new wells were drilled at a higher elevation in the structure, where the mean oil-saturation thickness of the formation was 10.1 m, which was 34 per cent greater than the mean oil-saturation thickness of the formation in which the wells of the basic stock had been drilled.

Table 2

№ скважины (1)	Дата начала эксплуатации (2)	Дебит нефти, т/сут (3)		Накопленная добыча на 1/I 1984 г., тыс $м^3$ (6)		Дата появления воды (9)	Обводненность на 1/I 1984 г. (10)
		начальный (4)	текущий (5)	нефти (7)	воды (8)		
7630	III 1978 г.	63,4	3,2	27,2	115,4	IV 1978 г.	95,0
7631	III 1978 г.	21,5	4,0	31,2	115,0	IV 1978 г.	95,3
7632	II 1978 г.	120,6	96,9	212,7	238,5	V 1978 г.	66,7
7633	IV 1978 г.	97,7	3,7	117,0	195,1	V 1978 г.	95,7
7634	IV 1978 г.	100,0	44,9	195,3	240,0	X 1978 г.	79,2
7635	IV 1978 г.	22,0	5,4	22,5	103,9	IV 1978 г.	93,7

Key: 1 - well number; 2 - date production began; 3 - production, t/day; 4 - initial; 5 - current; 6 - cumulative production as of January 1, 1984, thous/m^3; 7 - oil; 8 - - water; 9 - date water appears; 10 - water encroachment as of January 1, 1984.

Mean water encroachment in wells of the basic stock reached 75 per cent during the drilling of the new wells, with oil production averaging 16.9 t/day. Figure 2 shows the dynamics of the basic reservoir development indicators. We can see here that with high levels of water encroachment in wells of the basic stock, the drilling of infill wells sharply increased current oil production and substantially reduced encroachment. The new wells came on stream at production levels of 21.5-120.6 t/day (Table 2). For the most part, water would appear in the wells at some point during the month after they were brought into production. The water encroachment here was analogous in nature to the encroachment in wells of the basic stock. Total oil production for the infill wells as of January 1, 1984 ranged between 22.5 and 212.7 thous/m^3, the figure for water varying between 103.9 and 240.0 thous/m^3 (see Table 2).

Table 3

Показатели (1)	Весь фонд (2)	Основной фонд (3)	Уплотняющий фонд (4)
	скважин (5)		
Накопленная добыча, (6) тыс. $м^3$:			
нефти	704.0	98.1	605.9
воды	1815.3	807.4	1007.9
Добыча на одну скважину, тыс. $м^3$: (7)			
нефти	64.0	19.6	101.0
воды	165.0	161.5	168.0
ВНФ, $м^3/м^3$ (8)	2.58	8.23	1.66

Key: 1 - indicator; 2 - total stock; 3 - - basic stock; 4 - infill stock; 5 - wells; 6 - total production, thous/m^3: oil, water; 7 - production per well, thous/m^3: oil, water; 8 - water-oil ratio, m^3/m^3.

According to data from geophysical studies, the current water-oil outline for the infill wells at the time of drilling was measured at the following absolute markers: well 7630 - 1174.8 m, 7631 - 1170.3 m, 7632 - 1171.6 m, 7633 - - 1173.5 m, 7634 - 1170.9 m and well 7635 - 1174.5 m. The water-oil outline for this reservoir initially corresponded to the 1174.4-m marker. Accordingly, during the period of operation of the wells of the basic stock, the water-oil outline has remained stable in the vicinity of wells 7630 and 7635, while in the areas of the other infill wells it has risen only slightly. Given the high levels of encroachment in the wells of the basic stock, this points to a low oil reservoir sweep factor at the initial well pattern density.

For purposes of comparison, Table 3 presents development indicators for the stocks of basic and infill wells for the period 1978-1983.

The same period saw each infill well produce an average of 101,000 m^3 of oil, which exceeds by 5 times and more the average production for a well of the basic stock. The water-oil ratio for the infill wells was 1.66 m^3/m^3, 8.23 m^3/m^3 for the basic stock. This proves once again the fact that not all oil reserves could be actively worked at the initial well pattern density.

To analyze the extent of the effect of well pattern density on development efficiency with respect to displacement characteristics we computed recoverable oil reserves both before and after the drilling of the infill wells. We employed the method described in [1]. As shown by the special studies referred to in [2], it yields the most acceptable results for fields in the Urals-Volga region under water-drive development. Displacement curves were constructed within the coordinates $\sum Q_в - 1/\sum Q_н$ (Figure 3).

At the stage of relatively high encroachment we see between these parameters the following linear relationship:

$$\sum Q_{ж} = A - B\frac{1}{\sum Q_{ж}},$$

where A and B are constants taking account of the full range of features characterizing the development process (the geological and physical characteristics of the formation, the heterogeneity of the formation, the properties of the formation fluids, the system of filtration flows etc.). The value A corresponds to the intercept on the $\sum Q_{ж}$ axis and is equal numerically to the recoverable reserves of oil, while B characterizes the angle at which the line intersects the $1/\sum Q_{ж}$ axis. The greater the value of B, the more effective the displacement process.

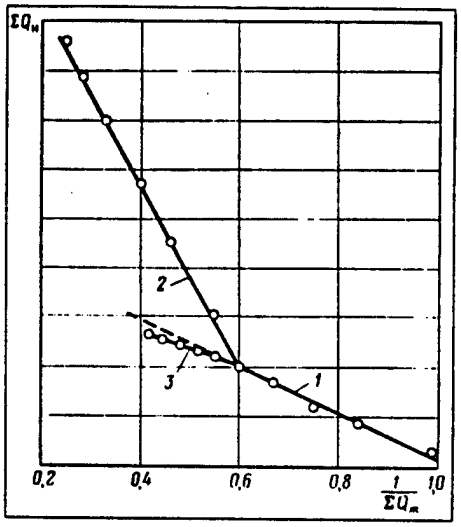

Figure 3. Reservoir displacement characteristic ($Q_{ж}$ represents total fluid production:
1, 2 - before and after the drilling of the infill wells respectively; 3 - basic stock only after the drilling of the infill wells

We can see from Figure 3 that the drilling of infill wells increases development effectiveness. Without the drilling of infill wells reservoir development is characterized by a B coefficient of 0.4614. The drilling of infill wells (line 2) increases coefficient B to 1.7967 and doubles recoverable reserves.

Figure 3 also shows the displacement curve for wells of the basic stock alone obtained after the drilling of the infill wells (line 3). The displacement efficiency for wells of the basic stock decreased slightly, coefficient B was 0.3674, and recoverable oil reserves were 8 per cent less than they would have been had the infill wells not been drilled.

The infill wells proved more productive than the wells of the basic stock since they were drilled in an elevated part of the structure where the oil-saturated part of the formation is thicker. If the wells of the basic stock had been drilled in this part of the structure it would have improved the efficiency of the process of developing this reservoir. The low level of well interference under the conditions of this experiment nevertheless points to the substantial effect of well pattern density on ultimate oil production.

The close dependence of oil production levels in the water-oil zone of the reservoirs on well pattern density established on the basis of field studies conducted in the

Arlanskaya field is linked not only to the great geological and physical heterogeneity of the producing formation, but also to manifestations of nonnewtonian properties in the oil of the formation, which are to be explained by the fact that this oil contains substantial amounts of high-molecular asphaltene, resin and paraffin compounds. In the case of a dispersed pattern located some distance from the wells, the pressure gradient does not exceed the Bingham yield point. This results in the formation of stagnant zones which play no role in the active development. By increasing the density of the well pattern we can increase the pressure gradient and bring the stagnant zones into the development process.

CONCLUSIONS

1. The presence of water-oil zones in the Arlanskoye field substantially degrades the development indicators for the formation, cuts the rate of recovery and ultimate recovery and increases encroachment.

2. The density of the well pattern in the water-oil zone of a reservoir has a substantial impact on ultimate oil recovery levels. By increasing pattern density from $22.5 \cdot 10^4$ to $10 \cdot 10^4$ m^2/well by drilling infill wells in an elevated part of the structure we can double ultimate recovery.

3. The drilling of infill wells in the water-oil zone at the current stage of operation in the field is improving the development indicators, increasing oil production sharply and reducing encroachment. At the same time, oil losses in the basic stock due to well interference are small, amounting to roughly 8 per cent.

4. The close relationship between oil production from the water-oil zones and the density of the well pattern in the field is to be attributed to the relatively high degree of heterogeneity of the producing formation, as well as to the nonnewtonian properties of the formation oil.

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OIL AND GAS

UDC 622.276.52

CAUSES OF SURGING IN GAS-LIFT WELLS AND HOW TO ELIMINATE IT

Moscow NEFTYANOYE KHOZYAYSTVO in Russian No 2, Feb 85, pp 28-30

[Article by A. P. Sibirev, V. V. Grekhov and R. R. Shigapov (NGDU Pravdinskneft') and V. A. Leonov (Yuganskneftegaz): "Causes of Surging in Gas-Lift Wells and How to Eliminate It"]

[Text] In virtually any oil field in which the gas-lift process is employed we will see a stock of wells in which, despite constant flows of fluid, there will be fluctuations (surges) over time in flow rate and pressure in the tubing. The figure for this type of fluctuation reaches 38 per cent in the Pravdinskoye field.

The cause of this surging is to be sought in an imbalance between the action of the formation and the functioning of the lift. This imbalance may be due to either the operational condition of the gas-lift equipment of the wells (malfunctioning gas-lift valves (due to decreases in valve charge pressure, mechanical failure of the seals etc.), vibration of the bellows-operated valve rod, improper spacing between the well chambers (mandrels) along the length of the tubing, a poorly sealed packer or the absence of one altogether, poorly sealed tubing and well chambers) or to the geological nature of the formation (irregular liquid flows, etc.). These factors will all cause fluctuations in bottom-hole pressure over time and, therefore, surging.

Surging is caused by fluctuations over time in the pressure in each section of the tubing. This can result in irregular functioning of the gas-lift valves, that is, in periodic openings and closings and, accordingly, in premature malfunctions (mechanical failures). Instability over time in the functioning of the gas-lift valves causes fluctuations in the rate of the gas flow and in the pressure in the lift. Surging may also be due to poorly sealed tubing with periodic exposure of the seal failure point. Considerable surging will also be observed when gas breaks through the tubing shoe, which can happen in the case of a poorly sealed packer or of the absence of one entirely. The specific flow rate of the gas in this instance will increase 2-4-fold.

Surging in gas-lift wells will cut the period of gas-lift valve operation between servicing sharply sharply, increase the nonproductive consumption of working agent and, consequently, decrease the efficiency of the rig overall. Random, uncontrollable surging, moreover, may impair the functioning of the well in the vicinity of the bottom and reduce flow rates. This makes it important to take timely steps to eliminate

it. The structure of the gas-liquid flow in the lift may also be responsible for fluctuations in instantaneous flow rates; but as field studies have shown, the bottom-hole pressure in these wells does not vary over time.

To determine whether surging is occurring in a gas-lift well, it will be necessary to measure bottom-hole pressure over an extended period of time, and this requires large expenditures in terms of both manpower and the time required to conduct the extended series of studies involved. Bottom-hole pressure is measured only in those wells in which it is practically impossible to determine the cause of surging by any other method. This technique makes it possible to establish the cause of surging with a high degree of precision.* This article defines a surging well as one in which 5-minute measurements of flow rate vary by more than 10 per cent. These differences

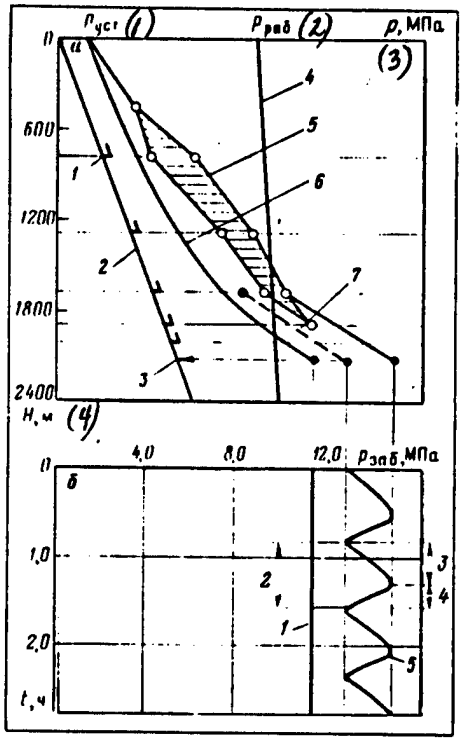

Figure 1. Results of hydrodynamic studies of well 1145 in the Pravdinskoye field: a: 1 - gas-lift valves; 2 - well profile; 3 - depth of gauge measuring bottom-hole pressure p_{bot}; 4 - gas-pressure distribution in the tubing-borehole annulus at wellhead gas pressure p_{work} (actual); 5,6 - pressure measurements p at intervals during surging and after replacement of third valve respectively; 7 - lines of minimum and maximum pressure below gas feed point; p_{wh} - wellhead pressure; b: 1, 5 - change in p_{bot} after and before replacement of valve respectively; 2,3,4 - periods of surging and decreases and increases in flow rate respectively.
(1) - p_{wh}; (2) - p_{work}; (3) p, MPa
(4) - N, m.

will usually be accompanied by fluctuations in both wellhead and working pressure and can alter the flow of the working agent, which confirms the presence of surging indirectly.

Figure 1 presents the results of hydrodynamic studies in well 1145 of the Pravdinskoye field. The change in instantaneous flow rates was 37 m^3/day with a mean flow

* Leonov, V. A. and Shigapov, R. R. "A Method of Identifying Malfunctions in Well Gas-Lift Equipment." NEFTYANOYE KHOZYAYSTVO, 1981, No 11, pp 66-68.

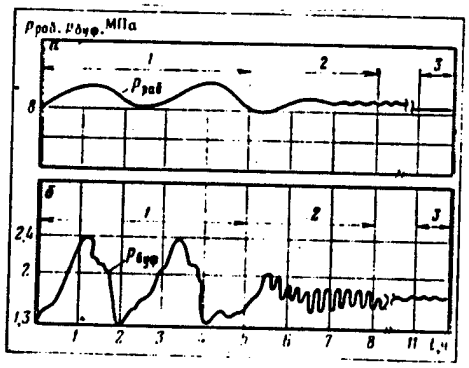

Figure 2. Change in working p_{work} (a) and wellhead p_{wh} (b) pressures in well 1173 of the Pravdinskoye field.

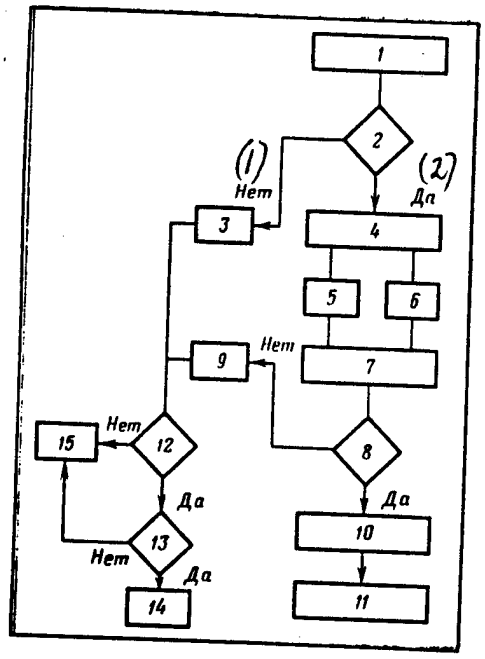

Figure 3. Diagram illustrating process of determining causes of surging and ways to eliminate it: 1 - identification of surging gas-lift wells on the basis of fluctuations in flow rate, consumption of working agent and in working and wellhead pressure over time; 2, 8 - condition test: do measurements of flow rate made at 5-minute intervals vary by 10 per cent or more?; 3, 9 - continuous operation of well; 4 - elimination of surging by varying flow of working agent within range of permissible values; 5, 6 - search for constant operating conditions at minimum and maximum working agent flow levels respectively; 7 - determination of efficient operating conditions from the point of view of eliminating surging or at least reducing surge amplitude (given a number of sets of operating conditions with identical surge amplitudes, select the regime with the minimum specific gas flow rate and maximum production at permissible bottom-hole pressure); 10 - establishing causes of surging from hydrodynamic studies; 11 - select least labor intensive method of eliminating surging takaccount of conditions 12, 13; 12 - condition test: do well flow rate and bottom-hole pressure coincide with desired values or are they

rate of 125 m^3/day. Measurements of pressure conducted at intervals under surge conditions did not allow identication of the cause of the surging (see Figure 1, a) due to the marked fluctuations in pressure at each interval of the tubing studied. After measuring bottom-hole pressure over a period of time (see Figure 1, b), it was found that the fluctuations in this pressure were due to malfunction of the third VKR-1 valve, which would open and shut periodically. After the third valve was replaced and production resumed, the well began to operate through the fourth valve at flow rates of 140 m^3/day with constant gas flow. Working pressure was 8.6 MPa. Inspection of the third gas-lift valve, which is actuated by the pressure in the tubing, showed that it was requiring 25 per cent less pressure to actuate the valve.

Before the valve was replaced the surging was being eliminated by varying the flow rate of the working agent. By reducing gas flow

Figure 3 (cont'd). permissible from the point of view of efficient field development?; 13 - condition test: is specific gas flow rate permissible from the engineering point of view?; 14 - satisfactory well operation; 15 - planning steps to be taken to bring actual well operating parameters into line with desired or permissible parameters.
(1) - no; (2) - yes.

from 7000 to 4500 m^3/day, for example, surging could be eliminated, although at the same time the mean production rate dropped to 102 m^3/day. Studies showed that the well then began to function stably through the second valve.

Given the fact that to identify the causes of surging in gas-lift wells requires laborious hydrodynamic studies, we try first to eliminate surging by altering well operating conditions. The effectiveness of this approach can be seen in Figure 2, which plots the change in working p_{work} and wellhead p_{wh} pressures over time t in well 1173 of the Pravdinskoye field. By using a twin-plot recording pressure gage it was possible to establish the occurrence of surges in these two pressures. Gas flow rate was 4200 m^3/day, liquid flow 84 m^3/day (see Figure 2, 1). Increases in gas flow to 5600 m^3/day raised flow rate to 117 m^3/day (see Figure 2, 2), while at a gas flow rate of 7100 m^3/day the well began to function smoothly at a flow rate of 162 m^3/day (see Figure 2, 3). Specific gas flow dropped 14 per cent from its original level. If surging cannot be eliminated by this method, we conduct hydrodynamic studies to determine the causes and then solve the problem by taking the technical steps.

The scheme illustrated in Figure 3 is employed at the Pravdinskoye field to establish the causes of surging and then to determine the approach to be taken in solving the problem. This scheme makes it possible to eliminate pressure surges in gas-lift wells in the shortest possible periods of time with the least expenditures in manpower.

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OIL AND GAS

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ADAPTIVE KELLY PROTECTOR DEVELOPED BY SEVKAVNIPINEFT'

Moscow NEFTYANOYE KMOZYAYSTVO in Russian No 2, Feb 85 pp 58-59

[Text] SevKavNIPIneft' has developed an adaptive kelly protector (AKP) designed to eliminate contact between the rotating square rod and the preventers and hook-up equipment and prevent wear on the wellhead tubing of the casing string.

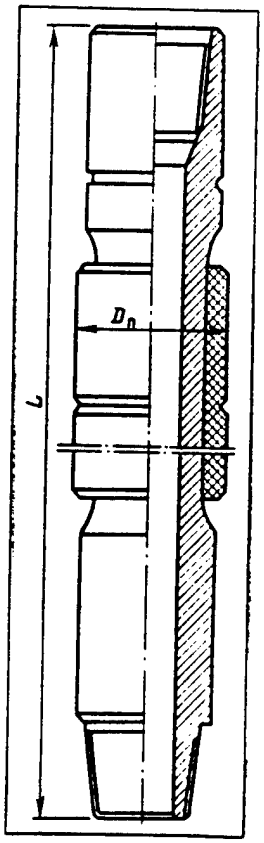
The AKP (see diagram) is an adaptive device, to the middle of which are glued two rubber protector rings designed by SevKavNIPIneft'. The small PMNK-2 peumatic device, also designed by SevKavNIPIneft', is used to fit these rings. The AKP, which now replaces the working kelly adapter, functions simultaneously with it until the protector rings break down or the thread on the adapter wears out.

Every wellsite should have two AKP, an operational one and a spare. The repair shop can restore the worn adaptive protector. The AKP is particularly effective in the case of wells which are going 4500 m and more.

Series production of this adapter began in 1977 at the Drogobych Special Mechanical Test Equipment Works. The pneumatic machines and the adapters may be ordered from the Soyuznefteburmashremont Association, the rubber protective rings per GOST 6365-74 (Type G) through the territorial material and equipment supply office.

Annual economies achieved with the use of this device by the Grozneft' Association alone are running between 120 and 140,000 rubles. The AKP is being successfully employed by many associations within the USSR oil industry, gas industry and geology ministries, Azneft', Ukrneft' and Krasnodarneft' among others. Economies of at least 2.5 million rubles have been achieved with this device since it was first introduced.

In 1980 and AKP adapters were admitted to the highest category of recognition by receiving the State Seal of Quality.



Design of adaptive kelly protector:

Protector	Length L, mm	Diameter, mm	Wt
AKP-146/146	1005	168	83 kg
AKP-178/155	1017	200	94
AKP-178/178	1030	200	129
AKP-203/178	1030	230	156

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OIL AND GAS

WORKERS CALLED TO AID TYUMEN EXTRACTION

Tashkent PRAVDA VOSTOKA in Russian 15 Feb 85 p 1

[Article: "Reinforcements to Tyumen "]

[Text] The oil field workers of Tyumen carry on their labors under inhospitable conditions. The climate, however, is not the only problem. The oil and gas they are producing must be extracted from great depths. When the pressure in a well drops, as it is expected to, the oil has to be pumped out. When you get past the oil-bearing horizon, you have to establish a new one, to "shoot" it, as the geologists say.

The problem, however, is that there is a shortage of manpower in the fields.

It is for precisely this reason that the USSR Ministry of the Oil Industry has gone to the country's oil workers with the appeal — Help Tyumen'! Workers and experts from Azerbaijan, Tadjikistan, Kirghiziya and Turkmeniya are now discharging their international obligations here.

An entire "assault force" of over 130 men took off from Uzbekistan to assist the oil workers of Tyumen in a sponsorship role. As V. S. Kim, deputy chief of the Uzbekneft' Production Association's oil and gas production section, told our correspondent, these reinforcements are now on the job in fields of Glavtyumen'enftegaz's Nizhnevartovsk-neftegaz and Surgutneftegaz associations.

Valeriy Sergeyevich expressed himself concerning this development in the following words:

"The dispatch of such a large group of oil workers from Uzbekistan to help in the fields of Tyumen, and this help will consist primarily in helping to 'stimulate' the functioning of the wells there, is an indication first and foremost of the respect there is for the skills and expertise of our colleagues and a recognition of their ability and desire to put forth a maximum effort."

This group of oil workers from Uzbekistan consisted of two brigades of capital repair personnel and three brigades of subsurface well repair specialists, oil production specislists and experts on the maintenance and operation of special equipment. It includes such respected Uzbekneft' association specialists as A. S. Tikhonov, chief of the geology department of the Dzharkurganneft' administration, A. Umarov, chief of the

Fergananeft' administration's production department, K. Abduraimov, capital well repair foreman for the Uzbekneft' Association, and others.

Work in the oil fields of Tyumen' goes on 24 hours a day. The reinforcements which have just been sent in from Uzbekistan will therefore be working on a shift schedule.

The oil workers from Uzbekistan will be repairing and putting back into operation more than 100 idle wells, which will increase oil production substantially. They will not, by any means, be a disappointment to anybody in Tyumen .

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OIL AND GAS

NEW EXTRACTION TECHNOLOGY CALLED FOR

Ashkhabad TURKMENSKAYA ISKRA in Russian 20 Mar 85 p 2

[Article by M. Tkachenko, chief, oil preparation and transfer section, Nebitdagneft' oil and gas production administration: "Why the Reservoirs are Empty"]

[Extracts] It would be no great exaggeration to say that all the oil fields in our NGDU [oil and gas production administration (OGPA)] run on our transfer and preparation department. In producing and processing 2700 tons of raw hydrocarbons above and beyond the volumes called for by the plan, the administration has overfulfilled its February plan, with roughly one-third of our oil going out in the highest quality category. As against the figures for the same period last year, this represents a considerable increase, but they are down from January.

As far as the facilities and equipment available to it, the department is probably better off than any other part of the OGPA. The problem, however, is that it does not have enough people to perform the repairs and preventive maintenance it requires. The enormous amount of equipment here (to include the field installations) is being serviced by no more than three mechanics at the Nebit Dag field and another three at Barsa-Gel'mes. Six people should be available as support for the normal operation of many of our oil heaters, pumps and a variety of other facilities and to monitor the status of reservoirs in all sections, in the 26 Baku Commissars settlement and at Burun and West and East Barsa-Gel'mes.

The equipment we are referring to is not really all that old, certainly no older than that in operation in our oldest field, Vyshka. Of the two furnaces (PB-16 heaters) in operation at the settlement, only one is in operation; the second has been idle for a third month now awaiting repairs. The two furnaces (PTB-10 heaters) at Barsa-Gel'mes have only one gas feed control between them, which is switched from time to time from one furnace to another. But this means that for the 1.5-2 hours required for all the readjustments the oil is feeding into the lines without being heated.

Of the reliability of the raw material reservoirs we can only dream—at any given time almost half of them are producing. As a reservoir empties out, it becomes more difficult to process the oil and at the same time impossible to let it go through the settling process it normally does.

Now what can the department do with its own available manpower resources, which must be admitted are meager? Since the beginning of the year we have run a line to steam

the coils of one of the PB-16 furnaces, and then another line out to a pit to purge the coils of oil residues; we have performed pressure tests and repaired one of the tanks with a water-repellent filter. People have come to our assistance by coming in to help with production operations on days off and the free hours they have during their work days. They know that when a furnace is down for several hours the content of water in the oil can rise to 10 per cent and that if a tank is not in proper working order the operators will have to pump the oil 2-3 times as many times.

These facts are also well known to workers of the technical services and subdivisions of the Turkmenneft' Association, whose manpower is now being called upon to perform maintenance and repair services. The department's complex equipment requires servicing by highly specialized personnel. Workers from the association's construction and installation administration have begun to take on the task of repairing improperly functioning tanks. Our department, however, has had to come to the aid of the specialists with the same number of "nonspecialists" and now even to play the role of supplier, what with the fact that the construction and installation administration is also short of materials.

The hire-and-repair shop of our Nebitdagneft' OGPA has taken on some of the furnace repairs. But it's been three months already, and they still can't decide whose people are going to do the work.

The roots of these difficulties go deep. The decades have seen a system evolve whereby the responsibility for both the quality of the oil going into the pipeline and the repairs on the equipment and facilities required to get it there falls on the same pair of shoulders. We have long since needed to create the OGPA's own operational maintenance and repair organization. The question, however, remains unresolved.

The creation of such a repair and maintenance organization would no doubt alleviate the problem to some extent, but it would not solve it entirely. What we really need to do is to stimulate the production of high-quality oil by our OGPA. Our brigades and all our field men are doing everything possible to bring our production figures up. The quality of our product, however, is leaving something to be desired. This, to a large extent, is what the introduction of the brigade-based cost-accounting system was supposed to address. The system was introduced during the past year in the second field.

But what is the introduction of cost accounting in only one component of the production cycle supposed to accomplish?! What we have to do is to introduce the system along the entire production front, from the well to the oil preparation and transfer department, to include all the associated services.

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OIL AND GAS

NEW TYPE OF DRILLING PLATFORM UNDER WAY

Moscow NEDELYA in Russian No 7, 11-17 Feb 85 p 4

[Article by A. Zadunov, Crimean Oblast: "Islands of Steel"]

[Text] Chernomorneftegazprom Association workers have begun preparations to set up platforms on the shelf off the Crimea for operations involving a new type of drilling. For the first time in the history of our off-shore drilling operations, a rig with all its equipment is being assembled on shore; it will be towed in large sections to its designated location, where it will then be positioned to rise above the waves. Vladimir Stepanovich Vovk, the association's general director for drilling operations, recounts below the story of the birth of this idea and describes how it is being implemented.

"Nature has hidden great volumes of her treasures in the form of gas under the waters off our shores. To be able to get at these treasures and exploit them we must build islands of steel from which we can drill. We have already learned a lot, it is true, from the experience of building our first stationary platforms a few dozen kilometers off shore. At first, we did most of the basic construction directly at the drillsite. Sections weighing no more than 100 tons or so (what with the fact that we had no high-capacity cranes at the time) would then be towed to the location where we were going to create our next artificial island. It isn't difficult to figure out what would be required to "stick" all this together to build a platform weighing 4-5,000 tons. And the stormy sea was by no means always ready to permit us to continue our assembly operations.

"The more we studied the problem, the more clearly we could visualize a process whereby we could assemble these platforms in large sections. The scientists and engineers went to work on the problem. We were asked to be the first to undertake the operational testing of the new technology involved in building these offshore drilling platforms. We are now in the process of consolidating our shore-based facilities and enlarging the area we use to assemble the larger sections. Plans call for the capacity of these facilities to rise to 15,000 per year. So we will be able to assemble three of these platforms each year on shore here. The scaffolding is also growing around the sites where we're putting up the facilities where we'll perform our preliminary processing and fabrication; it will also serve as the dock from which the assembled platforms will depart on their journey out to sea. Some of the components which will be used to assemble these large floating sections, some of which will weigh as much as 1000 tons, are already waiting in the assembly area.

"To carry out this project we have created a special construction and installation administration. Sections with the production and drilling equipment, the helicopter landing pads and quarters for the operations personnel will be assembled on shore and then towed out to sea, where they will be joined together over the course of several days. The lower section will be lowered to the seabed, at which point the drilling section can quickly be readied for occupation and put into operation. The need to worry about the weather during this operation has been reduced to a minimum.

"The engineers who developed this procedure have calculated that by changing over to this new method of building offshore drilling platforms, we will be able to do the job in half the time it took before. The cost will come down as well."

8963
CSO: 1822/208

YAMBURG GAS DEVELOPMENT PROBLEMS DISCUSSED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 6 Feb 85 p 2

[Interview with V. Kuramin, deputy minister of Construction of Petroleum and Gas Industry Enterprises, by SOTSIALISTICHESKAYA INDUSTRIYA correspondent Yu. Belanov in the column "Our Dialogues: Production Startup Problems": "Polar Alternative"; Tyumen, date not given]

[Text] The production startup of specially designed underground storage facilities in Western Siberia involves a continuous migration of construction workers into regions almost inaccessible to the north. Hence the habitation of Samotlor and the gigantic gas deposits of Medvezh and Urengo. And now subdivisions of Minneftegazstroy [the Ministry of Construction of Petroleum and Gas Industry Enterprise] have stepped across the Arctic Circle. How is the permafrost to be attacked? What sort of organizational methods of construction make it possible for us, pressed for time and with extremely limited outlays, to put into production Yamburg, Novyy Port and other deposits of the Far North? Discussing these questions with our regular correspondent, Yu. Belanov, is Deputy Minister of Construction of Petroleum and Gas Industry Enterprises V. Kuramin.

[Question] Vladimir Petrovich, Tyumen Oblast is rightly called the experimental laboratory for oil-and-gas-site construction. Almost 20 years ago, the complete-modular industrial construction method was introduced at the Ust'-Balyk Oil Field. Since that time, the collective of Sibkomplektmontazh Association has manufactured about 15,000 different complete-modular structures. The total savings from the implementation of these structures is over 2 million rubles. Is this tested construction method suitable for use at Polar gas sites?

[Answer] No technical solutions are being automatically accepted for Yamburg, even if they have been proven in other regions. This is largely due to the permafrost, which raises the labor intensity of this work by 30-40 percent. The laying of foundations is more complicated. The socle covers above ventilated basements need to be heated. The installation of utility lines is much more complicated. There might be one solution to this: change from modular boxes to large modules that are completely or almost completely operational.

[Question] Do you have in mind the experience of building the oilfield infrastructure at Prudhoe Bay, Alaska? In that case, complete modules weighing up to 2,000 tons were installed.

[Answer] The Canadian approach is good in Alaska, where there is an abundance of gravel to make reliable roads. Unfortunately, there are no such "gifts of nature" in northern Tyumen Oblast. Therefore, we have to seek out other technical solutions, such as pontoon modules, for example.

[Question] If I understand you correctly, Vladimir Petrovich, then pontoon modules or super-modules represent a new, more efficient stage of the complete-modular industrial construction method. What is the pontoon module and what are its advantages over the modular box?

[Answer] This is a special vessel which can travel over water or land. It can haul various types of equipment nearly ready for immediate factory use. Despite the variety of super-modules, they are standardized as much as possible. Varying sizes of a single type of pontoon will handle integrated gas-preparation installations, water-supply stations, motor-oil production units and other equipment. If all the production sites of this giant gas-production area were constructed with super-modules, it would result in great savings: about 100-120 million rubles.

[Question] In preparing for our discussion, I visited a pontoon module installation site on the shores of the Tura River. The brigade of Hero of Socialist Labor M. Buyanov is working there. With Mikhail Ivanovich's permission, I'd like to share with you a small fragment from his diary. These are the thoughts of a worker on the fate of an important matter for the government. May I share it with you, Vladimir Petrovich?

[Answer] I'm always happy to meet with one of our excellent brigade leaders, even if only through correspondence.

[Question] This is what brigade leader Buyanov wrote in his diary: "During lunch, Petr Dmitrievich Poluyanov, the leader of the neighboring brigade, and I made some calculations. And this is what our arithmetic showed. Each integrated gas-preparation installation at Yamburg will require about 40 pontoon modules. A total of seven installations will be needed at the gas field. This means that we must manufacture and deliver a minimum of 280 super-modules to the polar region. Considering the fact that our Sibkomplektmontazh Association produces no more than seven super-modules annually, this important task will take 40 years!

"Make it a half-century just to be sure!" is the joke among our installation workers. After all, pontoon modules will be used to manufacture the compressor stations, living quarters, bath-laundry combines, produce refrigerators and other public projects. And not just for Yamburg. The Novyy Port and Kharasavey fields on the Yamal Peninsula will follow that. The workers wanted this arithmetic to be passed on to the association's management. We won't complete this gas giant by working at a snail's pace. We can't get by without our own shipyard..."

[Answer] This is all true. The polar Yamburg, which is to provide the main gas-production increase for the 12th Five-Year Plan, cannot be built without giant super-modules. Work is presently underway to develop modules weighing 1,000 tons or more. A group of designers is now developing a special group of super-modules weighing over 1,500 tons. Such modules would be nearly ready-to-run shops for gas-processing plants. They could be transported over navigable rivers or on specially built canals.

[Question] We are coming to an important aspect of the problem of further developing the complete-modular industrial construction method. After all, the shipyard that brigade leader Buyanov was talking about is a new type of specialized enterprise.

[Answer] Our Siberian Scientific-Research and Project Institute of Gas Construction [SibNIPIgazstroy] is already completing development of such an enterprise. It will produce a minimum of 200 pontoon modules per year. The difficulty of the problem is that for the first time in domestic industry practice, an industrial enterprise will be created by combining two previously unconnected sectors: construction and shipbuilding. There is also a problem of transport. If a super-module vessel is moved over land, then the structure will unavoidably be damaged, or else the entire bottom surface must be made extraordinarly strong, which is also practically impossible. This leaves two appropriate solutions, which are presently being worked on: one is to develop special heavy transporters, build roads for them and construct docks with powerful cranes. The second approach is to develop large air-cushion vehicles.

[Question] As far as I know, there is no experience anywhere in the world with transporting 1,000-ton modules on air-cushion vehicles. The Ministry of Construction of Petroleum and Gas Industry Enterprise [Minneftegazstroy] so far has conducted only one experiment, when a 290-ton module was transported on an air cushion for a distance of less than one kilometer. And that was on a smooth sand path. So the problem of transporting super-modules must be solved starting with a clean slate. And it will take a long time to solve. Sibkomplektmontazh Association was to have manufactured and delivered to Yamburg a very simple test module during last year's shipping season. This was so that they could experiment with transporting it over dry land this winter, using an air-cushion vehicle. The shipping season ended a long time ago, but the module and the air-cushion platform are still not ready.

[Answer] We are taking all measures to continue the Yamburg experiment. We see that our sector's SibNIPIgazstroy, which as a whole is doing fruitful work in developing pontoon modules, has not completed some tasks. These are our internal difficulties, and we will correct them. Minneftegazstroy cannot alone handle the design proposals. I would like to end our conversation on this point. The complete-modular method using large complete-modular units must be approved in the usual manner as the basic direction of construction in distant, hard-to-reach regions. While not shelving this matter, work must begin on a method of pricing projects built with large complete-modular units. Approval must be quickly given

for the proposed procedure for developing production documentation for projects built by the complete-modular method. The sequence of equipment delivery must be strictly regulated.

We understand that our proposals will involve certain expenditures. But, they will undoubtedly be paid back by the billions of cubic meters of natural gas that the rich Polar Tyumen gas fields will provide the country in the first half of the next five-year plan.

12595
CSO: 1822/176

OIL AND GAS

TATAR DRILLERS AIDING EFFORTS IN TYUMEN OBLAST

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 5 Dec 84 p 1

[Article by B. Lovanov, chief engineer of Tatneft' Association, Almetyevsk: "On Tyumen Time"]

[Text] As was reported earlier, the CPSU Central Committee Politburo approved, at its scheduled meeting, the initiative of the Bashkir and Tatar party obkoms to offer aid to Tyumen Oblast. The initiative's aim is for Bashneft' and Tatneft enterprises and organizations to help increase oil production in Tyumen Oblast. This article discusses the present activities and near-term plans of the Tatar oil workers to put Siberian oil fields into production.

As it is, the oil worker gets up early. But for those who are considered "Siberians" at production sites in Tatar ASSR, the working day starts two hours earlier--on Tyumen time. Three of our drilling administrations--the Menzelinskoye, Bugul'minskoye and Bavlinskoye--are presently involved in the Siberian work. Under difficult conditions a long way from their main bases, the collectives of "flying oil workers" this year will drill through about 1.5 million meters of rock.

Today, about 6,000 of our workers are living by the watch-expedition method. We have become accustomed to this because of the enormous scale of the Siberian resources and the unusually high rate at which they are put into production. Of course, it's not cheap to fly people to the work site. But the advantages of this method are immeasurable.

Therefore, the workers of award-winning Tatneft' are working hard in distant Siberia, with an understanding of how important their work is to the government. They are now using in Siberia all the new and innovative things they have learned at their own production sites. By the end of this year, our subdivisions will have put 560 new wells into production, carried out downhole maintenance of 280 wells and worked over 65 wells. This will provide millions of tons of oil production.

Our drillers are now competing equally with the illustrious Tyumen high-speed drillers. For instance, the brigade of foreman M. Aglyamov, from the Menzelinskoye Exploration Drilling Administration, has now won a

Moskovich automobile as a ministry prize. Several months ago, this collective's production started being credited to the final year of the five-year plan. The Bugul'minskoye drillers, armed with a brigade contract, have been working ahead of schedule in Western Siberia. Taking into account local conditions, they have concluded an agreement to simultaneously build an entire cluster of wells.

All of the new production subdivisions are joining in the brigade contract. It encompasses the entire oil-well construction cycle. The startup brigades are now much more interested in finishing projects on time, since the financial state of the drilling administration is directly dependent on the end results.

Our geologists and geophysicists have done much work in Tyumen Oblast. Bugul'ma workers from Tatneftegeofizika Trust, one of the country's largest geophysical enterprises, helped organize a watch-type production site-geophysical expedition in Nizhnevartovsk. In recent years, its volume of work has quadrupled. The trust's specialists fulfill all research orders with high quality and maximum efficiency.

Our experience has allowed us to come out with a new initiative. The Tatar oil workers have decided to take upon themselves full responsibility for the development of several Tyumen oilfields. The Ur'yevneft' and Pokachevneft' oil-and-gas-production administrations will become subdivisions of our association. The plan output will be the responsibility of Tatneft', giving the collectives more of an interest in the end results.

The main tasks, out of the multitude that need to be solved, are the creation of capital bases, housing construction and construction of repair subdivisions. Both administrations are in the "wilderness," over 100 km from Nizhnevartovsk. While there is a small residential settlement in Ur'yev, there is only a watch settlement in Pokachi. Therefore, capital construction is a special concern. The specialists of the Tatar State Scientific-Research and Project Institute of the Oil Industry have much work ahead of them.

We understand that this new stage of participation by the Tatar oil workers in developing Tyumen fields will bring no small number of serious problems. The organization forms of cooperation with the Siberians are now being clarified, and the structure of our Tyumen subdivisions is being improved. We are also thinking about forms of party-mass work in collectives far from their main bases. All of this work would be impossible without the close cooperation of party and economic organizations in Tyumen Oblast, since we are involved in a large joint effort. This means that close interaction and coordination of efforts are necessary.

12595
CSO: 1822/176

BRIEFS

TURKMENISTAN GAS CONDENSATE FIELD--Final field construction work has begun on the first phase of the Sovetabad gas condensate field in Turkmenistan, which will be the largest in Central Asia. In addition to the existing production facilities, the last unit for preparing the gas for transport is nearing completion here. Plans called for this unit to be brought into operation in March. When field production here reached planned capacity it will be supplying some 15 billion m^3 of gas to the main Central Asia-Center pipeline each year. Construction workers here have been working at a fast pace from the very beginning of the project. The multinationality Shatlykgazstroy Trust, which has built facilities at the Shatlykskiy, Mayskiy, Dovletabadskiy and other fields in the Karakumy, has made extensive use of the most advanced methods here at Sovetabad. Together with the construction of the primary facilities and units which will prepare the gas for transport, it has also started work on the housing and communication lines. Here at Sovetabad it has used prefabricated metal components, which made it possible to frame the production facilities within only brief periods of time. The customer, the field construction directorate, was responsible for assembling equipment at the builders' central facility in Shatlyk and then transporting it in large sections over the hundreds of kilometers through the desert. [Excerpts] [Ashkhabad TURKMENSKAYA ISKRA in Russian 10 Mar 85 p 2] 8963

MUBAREK GAS PROCESSOR--Final adjustments have begun on facilities and equipment for the ninth section of the Mubarek gas processing facility deep in the Karakumy. "No. 9" will have a capacity of 1.5 billion m^3 of gas a year. It was not so long ago that the 80-meter flares at this installation were coming out of pipe of uniform diameter, and to make it stable was requiring a great deal of extra metal construction, a lot of manpower and prolonged periods of construction. A telescoping design of two flare tubes 1400 and 1200 mm in diameter has made it possible to cut the manpower requirement in half. [Excerpts] [Moscow IZVESTIYA in Russian 14 Feb 85 p 2] 8963

MORE GAS FOR MORDOVIYA--Two more large rayons in Mordoviya, Lyambirskiy and Romodanovskiy, are now being supplied with main pipeline gas. Cheap natural gas began arriving ahead of schedule here via new branch lines. Local councils of people's deputies throughout the autonomous republic took the initiative of arranging for workers from enterprises and organizations in the agroindustrial complex to give the construction workers a hand. Thanks to this joint effort, the annual increase in the length of the rural gas lines here has more than doubled over the course of the current five-year-plan period. [Text] [Moscow IZVESTIYA in Russian 22 Feb 85 p 1] 8963

UZBEK FACILITY ON LINE--Combined testing has begun at all production facilities of the third section of Uzbekistan's largest gas production facility in Shurtansk. The 21-kilometer steel pipe which will link facility which preprocesses the "blue fuel"

coming from the well with the primary facilities, has already been blown out. Water under a pressure of 138 atm is now being pumped into this line to check the strength of each joint. Hydraulic tests are also being completed on the gas scrubber. With the start-up of the third section, natural gas deliveries from the Shurtanskoye field to the main pipeline system will increase by several billion m^3 per year. [Text] [Tashkent PRAVDA VOSTOKA in Russian 19 Feb 85 p 1] 8963

FIRST KAMCHATKA GAS FIND--Petropavlovsk-Kamchatskiy--A powerful fountain of gas shot from the well drilled by the oil exploration workers on the Kamchatka Peninsula. Tests showed that the well will produce over 300,000 cubic meters of gas per day. This is the first large success scored by the specialists of the Kamchatka Oil and Gas Exploration Expedition of Sakhalingeologiya Association. The gas find on the peninsula will provide many benefits for workers of that region. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 22 Jan 85 p 1] 12595

KYURSYANGI DEEP-WELL DRILLING--Salyany, AzSSR 3 [Feb]--Drilling has begun here at the Yuzhnaya Kyursyangi area of a well designed to be 6,200 meters deep. It will be the deepest dry-land oil-and-gas-exploration well in the republic. The well is to penetrate the little-studied Kurinskaya Depression and reach a horizon analagous to the high-production seventh horizon, which has long been successfully producing offshore nearby. The work has begun, and the specialists are following it with great attention. [By PRAVDA correspondent L. Tairov] [Text] [Moscow PRAVDA in Russian 4 Feb 85 p 1] 12595

PAMUK GAS FIELD STARTUP--(UZTAG)--The infrastructure of the new Pamuk Gas Field in the Karshinskaya Steppe has been constructed. A integrated gas preparation installation with a design output of three billion cubic meters per year has been put into production here. The installation is a large technical system to remove mechanical impurities such as gravel and sand from the natural gas. It also separates condensate from the gas. The gas goes from here to the Mubarek Gas Processing Plant, and from there to the main gas pipelines into the industrial centers of Uzbekistan, the neighboring Central Asian republics and the Urals. [Text] [Alma-Ata PRAVDA VOSTOKA in Russian 13 Jan 85 p 1] 12595

OIL DRILLING NEAR IGARKA--Krasnoyarsk Kray--A well has been drilled to a depth of several hundred meters at the first drilling rig of the Igarka Oil and Gas Exploration Expedition, which is 150 km from the famous forest port. The success in the search for oil is aided by confidence in the end result--the drillers are not working on intuition alone. The presence of Igarka oil was predicted by scientists of the Siberian Department of the USSR Academy of Sciences and was confirmed by geophysical data. [By

IZVESTIYA correspondent A. Shcherbakov] [Text] [Moscow IZVESTIYA in Russian 25 Jan 85 p 2] 12595

DEEP AZERBAIJAN WELL STARTED--Salyany (AzerINFORM) 31 [Jan]--Drillers of the Kyursangya Drilling Administration have begun drilling the deepest on-shore well in Azerbaijan. They have to break a path over six kilometers down to a structure favorable for the accumulation of oil and gas. The structure was found by geologists in the Yuzhnaya Kyursangya area. In order to drill this unique well, workers from Gobustan Derrick-Installation Office built a rig consisting of an especially heavy-duty derrick and a machine room equipped with automatic devices. The drillers had previous experience with a similar installation in Groznyy. Since the drilling rig is located in the Shirvanskiy Preserve, steps were taken to prevent environmental pollution. The well will be a so-called parametric well. In other words, geologists will be able to take rock samples every 45 meters for research. To this end, a Start-2 geological-technical control station was installed at the well. The drillers have 1,100 days to drill the well. The data obtained will allow a detailed study of the prospects of one more little-studied oil-bearing area of the Kurinskaya Lowlands. [Excerpts] [Baku VYSHKA in Russian 1 Feb 85 p 1] 12595

KAMCHATKA COMMERCIAL GAS FIND--Petropavlovsk-Kamchatskiy--The Kamchatka oil and gas exploration workers have marked the start of the final year of the five-year plan with a new success: they have produced the peninsula's first commercial gas flow. "In the Kshukskaya Area," says D. Shaymardanov, chief of the Kamchatka Oil and Gas Exploration Expedition of Sakhalingeologiya Association, "eight wells were drilled. Five of them encountered gas-bearing formations. Two wells, Nos 5 and 8, produced commercial gas flows of up to 280,000 cubic meters per day." This year, the unpredictable Kamchatka weather provided the drillers with the worst working conditions ever. The thermometer has been reading minus 30 for over a month, and the strong wind (up to 25 meters per second) from the Sea of Okhotsk has brought an abundance of snow. [By S. Kashin] [Excerpts] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 26 Jan 85 p 1] 12595

ZHANAZHOL FIRST PHASE COMPLETED--The production workers at the new Zhanazhol Field in Kazakhstan will separate a million tons of oil from gas per year. The first phase of the field's construction has been completed. The sulfur-removal installation has been put into operation, completing the last link in the process cycle of this large complex. The oil will be put into the Guryev-Orsk Main Pipeline, while the residual gas is being used to maintain formation pressure. [By IZVESTIYA correspondent E. Matskevich] [Text] [Moscow IZVESTIYA in Russian 17 Dec 84 p 1] 12595

NEW CASPIAN WELLS--Baku, 21 [Jan]--The brigade of A. Babaev from the Imeni XXII S"yezd KPSS Production Association has produced the first oil from wells 104 and 108. The wells are free-flowing at an average rate of over 500 tons per day. The wells are located far offshore on the platform in the Imeni 28 Aprel' Field. Nine high-production wells are already operating here. There will eventually be 12 wells. [By PRAVDA

correspondent L. Tairov] [Text] [Moscow PRAVDA in Russian 22 Jan 85 p 1] 12595

CASPIAN WELLS STEADY PRODUCERS--Neftyanyye Kamni--Well No 2123 operated for 2 years without any maintenance shutdowns. Recently, the well was briefly shut down to remove a sand blockage and to free the first string of lift pipes, which had jammed. The well will again begin producing up to 40 tons of pure crude oil. The other six wells in the same area of the northeast flank of Neftyanyye Kamni have been producing for almost as long. The site workers skillfully service these very deep and very high-output wells. They produce almost 60 percent of the site's crude oil; therefore, the experienced operators and foremen do their preventive maintenance promptly. For instance, well No 1904 was recently shut down for maintenance precisely on schedule. In several days, it will again be connected to the gathering main. The collective of the first shop has taken on the responsibility of producing 10 tons of oil above plan by Soviet election day. [By O. Yur'yev] [Excerpts] [Baku VYSHKA in Russian 26 Jan 85 p 1] 12595

CSO: 1822/176

BOTTLENECKS AT BALAKOVSKAYA AES BEMOANED

Moscow SOVETSKAYA ROSSIYA in Russian 12 Feb 85 p 2

[Article by correspondent Yu. Burov in Saratov Oblast: "Like an Empty Sound"]

[Text] At the end of last year, there was a correspondent's report published titled "Personally responsible", in which there was discussion of a dangerous situation which was complicating construction at the Balakovskaya AES. The primary causes of an interruption in bringing the power unit on line were a violation of the network schedule and a low level of performance discipline. What lesson have the builders learned from the assumed mistakes?

The managers leaving the regular planning session were obviously vexed. None of those present at the planning session could guarantee that the deadlines which were established for the current year for startup of the first energy unit would be met. Of the 900 station facilities which were to have been finished by the start of the second ten-day period of February, they had finished only 220. In total, of the 67 buildings of the project, the builders had turned over only 45.

"Certainly a lack of experience had adversely affected it," noted Ye. Ignatenko, chairman of the State Acceptance Commission evaluating the present tempo of work. "But the main cause of the interruptions, just as last year, remains the weak work and technological discipline, and the lack of coordination of the actions of those associated..."

It is true that there are several examples seen at the site which confirm E. Ignatenko's opinion. How many days have there been since four crews of ventilation workers have been without work because they were not supplied with a crane. Turbine fitters led by V. Zhitenev at first saved a great deal of little time, but then lost this reserve because the concrete workers let them down.

Walk up to a group of installers of A. Olenin's crew who have been on a "smoke break" for about three hours already. Learning that a correspondent was before them, they interrupted one another in voicing their complaints:

"We sit more than we work. We have no instructions; there are no materials; there are not enough tools. We thought that a journeyman would help out, but we have not laid eyes on him in two weeks."

Recently members of the Komsomol Spotlight conducted a raid to check out work discipline. They discovered that the work shifts are "shortened" both for individual builders and for entire crews.

Strict control on work discipline is certainly essential, said crew leader N. Kostin during our meeting. "But it is even more important to establish conditions which do not allow us to spend time in vain. So far in the reactor section there is only one elevator working--how much time has been wasted running up and down.

A few days ago the building project party committee had a special meeting with party groups about strengthening discipline. But the discussion was obviously unsuccessful. Deputy Secretaries of the Party Committee A. Plankin and N. Yermolayeva expressed good hopes, and cited a number of slogans that are known to all. In response, the party group organizations spoke out about the overdue problems, about the fact that it is essential to assign work to the crews in a timely manner, essential to regularly produce summaries of what has been done, to more closely coordinate with the workers of middle management--the journeymen and superintendents. The organizers and those invited left the meeting without having understood one another, without making a constructive decision.

The construction site's many problems were certainly not born today. Two and a half months ago they were discussed at the bureau of the Balakovo City Party Committee. At that time there were complaints to supervisors, and party professional committees about the weak organizational and mass-political work. The general contractors and the directors of the AES assured the bureau that the shortcomings would be corrected without delay. But, as time has shown, these assurances turned out to be empty sounds.

9016
CSO: 1822/177

NUCLEAR POWER

BRIEFS

NIKOLAYEV UNIT ON LINE--Nikolayev Oblast--A second 1 million kilowatt power unit has come on-line at the Yuzhno-Ukrainskaya AES. The high-level engineering of the units, the precise organization of labor, and the creative utilization of accumulated experience made it possible for the power block's builders to turn it over for exploitation ahead of schedule. The second unit of the AES is already feeding into the unified power network of the nation. The plant's collective is obligated to bring it on line two months ahead of schedule, in time for the 40th Anniversary of the Great Victory. [by correspondent A. Pasechnik] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 2 Feb 85 p 1] 9016

REDUCED METAL NUCLEAR TURBINES--The Leningrad Metal Plant has started series production of a "millionaire" turbine for use in atomic power plants, which contains a sharply reduced amount of metal. Assembly of such a turbine has been initiated for the Khmel'nitskaya AES. [Text] [Moscow ECKONOMICHESKAYA GAZETA No 5 in Russian Jan 85 p 3] 9016

CSO: 1822/177

NON-NUCLEAR POWER

PLANS FOR SECOND LINE AT LENINGRAD TETS CONFIRMED

Leningrad VECHERNIY LENINGRAD in Russian 12 Jan 85 p 1

/Article: "For New Construction Project Blocks"/

/Text/ Good news arrived at the Severnaya TETs/heat and electric power plant/ from Moscow. The USSR Ministry of Power and Electrification has approved the project for the station's second section. This year its working design will be developed and the builders must begin carrying out the first operations at the site of the new complex. The TETs director, N. F. Tolkachev, comments on this report in a discussion with our correspondent.

"Our station is now the largest in Leningrad. Its five blocks have a total electrical capacity of 550,000 kilowatts and it can produce more than 1,000 gigacalories of heat per hour. We are providing a huge area of several hundred residential buildings in the northern part of the city, and several enterprises, children's, medical, and municipal and domestic institutions with heat and a hot water supply."

"However, the northern part of Leningrad is an area for future build-up. Each year several new blocks of large residential buildings rise here and enterprises and institutions are being constructed. Therefore, a decision was also made to further develop our station. What will its second section be like?"

"This power complex will have two large blocks, the purely electrical capacity of each will reach 210,000 kilowatts, and during their use and for generating heat--180,000 kilowatts. The heat productivity of each of these blocks is 260,000 gigacalories. They will have their own cooling towers and the plan is also to build yet another substation and a large heat route."

"The second section must be fully commissioned in the 12th Five-Year Plan. Its projected pay-off period is 5.8 years. However, the collective of operators is trying, as always, to shorten this period. As necessary, the construction of a third section of the station has not been ruled out for the future."

8524
CSO: 1822/187

NON-NUCLEAR POWER

CENTRALIZED REPAIR ORGANIZATION FOR GRES ADVOCATED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 3 Mar 85 p 2

/Article by STAVROPOL'SKAYA PRAVDA correspondent L. Petrov: "On Whom Did the 'Sham' Cast a Spell"/

> /Text/ Two large Stavropol Kray enterprises--the Karachayevo-Cherkesskiy Cement Plant and the Nevinnomysskaya GRES/state regional electric power plant/--have encountered the same problem: unreliable equipment operation. The reason, as they determined, was the ineffective management of repair service, during which the interests of the repair people did not coincide with the interests of the operators. This problem is now in the past for the cement workers. Its acuteness is growing is growing all the time for the power workers.

Appointed the director of the cement plant in 1980, Viktor Stepanovich Platonov, Candidate of Economic Sciences, honored innovator of the RSFSR, took over the enterprise in a disastrous state. A great number of letters on this same topic came to the party and soviet organs: the plant is hampering agreed-upon cement deliveries, thereby delaying the construction of housing, feed plants, dairy complexes, and irrigation projects. Analyzing the situation, the new manager was able to isolate the main cause of the disruptions.

"The paradox was that a great number of people at the plant were economically interested so that...the enterprise operated poorly. The job was set up in this way: to achieve success at any cost. The price was indeed high--equipment became unserviceable daily and machinery was operated without let-up. The volume of repair work snowballed. The repairman's job became the largest at the plant."

In 1980, the plant had only 60 of its own repairers; while 600 more were drawn from subcontractor organizations. Moreover, the amount of their wages was determined by the number of repairs. The immediate manufacturers of cement received scant wages because of interminable idle periods. A unified collective, directed toward a common end result, simply did not exist. It was like this concerning the result itself: the maximum would be a sort of feverish activity and the minimum was real cement at a huge overexpenditure of electric power and other resources.

The cement plant managers took a bold step: after enlisting the support of the ministry, they boldly gave up the services of the subcontractor repair people. They reduced their own repair crew from 60 people to 12, and then to eight. A total of six repairmen have remained at the enterprise since last year. They are handling their jobs excellently.

The point is that they began paying the repairers not for the amount of repairs done but for the uninterrupted operation of equipment in the post-repair period. The longer it is in operation, the more you receive. However, if a reduction in equipment efficiency occurs during the warranty period, kindly repair it at your own expense.

This is the impact--the repairmen have decreased ten-fold and the equipment is running five times as long because the main attention is being paid to preventive maintenance. With a decrease in the huge expenditures for repairs, the elimination of idle periods, and the growth of labor productivity, the possibility has arisen of more pay for the basic production workers. Personnel turnover has decreased to nine percent--this is one of the best indicators in the industry.

This past year the enterprise produced 100,000 tons of cement above the plan and labor productivity grew by four percent. Some 15 million kilowatt hours of electric power have been saved since the beginning of the five-year plan.

In another scenario, events have developed and are continuing to develop at the Nevinnomysskaya GRES where they have encountered the very same problem that the repair people had. With the saturation of the station with ever newer and newer units of equipment, work volumes for servicing and repair began to grow like an avalanche. Meanwhile, according to the work effectiveness indicator (number of personnel per one thousand kilowatts of power), the Nevinnomysskaya GRES power workers were the best in the industry. How was that? The secretary of the GRES party committee, V. Severinova, cleared up the puzzle.

"A single stroke of the pen raised us to the advanced level. About 300 repairers, who formerly belonged to the GRES, were transferred to the contract repair enterprise of the regional administration Stavropol'energo/Stavropol Administration of Power System Management/ which roams among various stations. It, along with other subcontractors--Rostovenergoremont/Rostov Administration for Electric Power Project Repairs/, Remtransenergo/Power System Transportation Repair Administration/, Yuzhenergoteploizolyatsiya/Southern Power System Thermal Insulation Trust/, Stavropol'spetsenergoremont/Stavropol Administration of Specialized Power Project Construction/, Yuzhenergokhimzashchita /Southern Administration for the Chemical Protection of Power Systems/, etc., a total of 27--has its own volume indicators.

"Where there are seven nurses the child is without supervision (too many cooks spoil the broth)," the workers bitterly joke in this connection. "And where there are 20," it is all the more so. Expenditures for repairs amounted to a huge figure--five million rubles a year. And for what purpose?"

This past year the operators had to shut down two blocks of the electric power plant several times because of defects in a just-completed repair. Almost 4,500 tons of standard fuel were overexpended after the poor repair of gas-air flues. Moreover, equipment down-time and fuel overexpenditure connected with repeated start-ups are growing.

It also pays to add to this the "educational impact" of such "progress." A majority of the breaches in labor discipline are on the consciences of the guest repairmen who have been arrested many times on station premises in a drunken state. But it is somehow difficult to act against the violators: they are not on the books at the GRES and their "native" organizations are far away.

Do they know about all of this at the ministry? They know. K. Gorskiy, the chief of Glavyuzhenergo/Chief Power Directorate of Southern Areas/, came to Nevinnomyssk several years ago. He would see for himself the nonsense of the so-called "progress" in repair work. He promised to take measures. And indeed, an order soon followed on establishing a single general contractor in the person of the repair enterprise Stavropol'energo. The idea was that the GRES would have business with it alone, and through it--with the remaining 26 subcontractors.

This, of course, was a half-measure and they forgot about the main thing: to tie the indicators of the repairmen to the final results of the station. As a result, the different economic interests of the parties both were there and also remained. The essentially "sham" effectiveness indicator also remained at a record-breaking high.

In January of last year, the communists of the GRES sent a letter to the USSR Minister of Power and Electrification, P. Neporozhniy, and the ministry's party committee secretary, B. Sobinyakov, which spoke about the bad situation with equipment repair. They suggested the liquidation of all small repair organizations and demonstrated that only the creation of a centralized repair shop at the GRES would permit a decrease in the number of repair personnel, a reduction in repair costs, an increase in responsibility for their quality, for the reliable and economic operation of equipment, and the uninterrupted power supply of customers. This is all the more so since there has been a positive experience for just such an approach at the Kostromskaya, Karmanovskaya, and Litovskaya GRES's.

They are still waiting for an answer to this letter at the station.

Thus, enterprises of two different ministries encountered the very same problem. However, while the union Ministry of the Construction Materials Industry supported with interest the initiative of the Cherkesskiy cement workers, the workers of USSR Minenergo/Ministry of Power and Electrification/ preferred simply to brush aside the suggestions of the Nevinnomysskiy power workers. Evidently, their "sham" effectiveness cast a heavy spell.

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PIPELINE CONSTRUCTION

PIPELINE CRACKING CAUSES LEAKS

Moscow PRAVDA in Russian 6 Mar 85 p 1

[Article by N. Mironov, PRAVDA staff correspondent, Bashkir ASSR "With a Margin of Safety: Fact and Commentary"]

> [Text] Yuzharlanneft' oilmen in Bashkiriya call the experimental pipeline that Ufa Oil Institute scientists installed a record-setter for reliability. There has not been a single accident here during its year and a half operation.

One of the most serious problems in oil production is frequent pipeline down time. After five or six months of operation steel pipe corrodes and starts to leak.

The principal reason for the short pipe life is the corrosive environment. It is certainly a fact that oil with water and high levels of sulfur, with hydrogen sulfide, or highly mineralized drainage waters are pumped through the pipes. In each area there are tens of kilometers of pipeline, and, therefore, accidents in one place or another are happening continuously. At Bashneft' Association enterprises there have been many "interruptions" during the year. A special service unit has been working to eliminate them.

What is the explanation for the reliability of the new pipeline? It is made of cast iron which is known to be more resistant to corrosion. Since cast iron can not be welded, specialists may ask how the pipes are joined together. The pipes are joined with the help of glue. No, scientists have not developed some sort of super-durable glue. Our industry has produced it for a long time. The trick is in the way the pipes are joined. Scientists at the oil institute developed this method. Tests showed that the bond withstands pressure of 100 atmospheres in pipe of up to 300 mm diameter.

The use of glue instead of welding promises not only to be very effective economically but also makes repair work safe, whereas welding under oil field conditions poses an explosion hazard.

The Novolipetskiy Integrated Metallurgical Works has commenced production of corrosion-resistant cast iron pipe utilizing the bond proposed by the Ufa workers. In the near future this product will be added to the arsenal of the country's oil workers.

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PIPELINE CONSTRUCTION

URENGOY-TSENTR PROGRESS NOTED

Moscow ECONOMICHESKAYA GAZETA in Russian No 11, May 85 p 15

[Article by G. Veselkov: "On the Gas Pipelines"]

[Text] Gas pipeline builders signaled the beginning of the last year of the 11th Five Year Plan with some most important work. In February on the gas pipeline Urengoy-Tsentr II the "red joint" [final joint] was welded well ahead of plan. This weld indicates the completion of welding operations on the last of six gas pipelines planned for this five year plan that will deliver Tyumen gas to the European part of the country. The completion of all lining work and the start of operation of the entire pipeline system are anticipated in March.

At present workers are completing pipe insulating and laying operations, doing ballasting and back filling of the pipeline, installing compressor station hook-up units, and storage tanks, running of scraper units and also purging and testing the pipeline.

As of 1 March 1,212 kilometers of the line's overall 3,032 kilometer length have been certified by government commissions and put into operation. Construction and installation collectives of Glavtruboprovodstroy [Main Pipeline Construction Administration] (I. Mazur, director) finished all lining work on their 900 kilometer section earlier than others. Units of Glavvostoktruboprovodstroy [Main Pipeline Construction Administration for Eastern Regions] (F. Mukhamedov, director) has the most work left to do (364 kilometers to purge and 900 kilometers to test). Glavsibtruboprovodstroy collectives [Main Pipeline Construction Administration for Siberia] (P. Shabanov, director) are close to completing operations on their 931 kilometer section.

Spread collectives headed by R. Kolodzey and V. Mikhaylyuk (Kazymtruboprovodstroy [possibly--Kazakhstan/Central Asia Pipeline Construction Administration]), S. Matsko (Vostoknefteprovodstroy [Oil Pipeline Construction Administration for Eastern Regions]) and P. Sukhovoy and V. Linnik (Nefteprovodmontazh [Oil Pipeline Installation Administration]) achieved the best results in socialist competition on the line in February.

Together with completion of operations the gas pipeline Urengoy-Tsentr II, construction and installation workers from Minneftegazstroy [Ministry of

Construction of Petroleum and Gas Industry Enterprises] are accelerating construction of the new pipeline Yamburg-Tsentr, that is planned for operation at the beginning of the next five year plan. To date 2,445 kilometers of steel pipe have been delivered to the pipeline route, of which 1,700 kilometers have been welded into lengths on stands, 920 kilometers have been moved out on to the route and about 700 kilometers have been welded into the line. The overall length of the route is 3,150 kilometers. There are 12 production lines working on its construction.

March is the most favorable time of the year for pipeline construction. Construction workers are expanding socialist competition on the job and accelerating the pace of their work to get as much done ahead of schedule, as they have on previous pipelines, before the onset of the spring thaw.

The construction of compressor stations continues. Of the 19 stations that units of Minneftegazstroy have been building on the Urengoy-Tsentr I pipeline, 13 are already operational, and the Urengoyskaya, Tayezhnaya, Pomarskaya, Ordinskaya, Sechenovskaya and Pelymskaya stations are close to completion. It is anticipated that they will become operational in March. It is necessary to raise the pace of operations at compressor stations whose construction has been entrusted to Minenergo [Ministry of Power and Electrification] and to Minpromstroy [Ministry of Industrial Construction].

Workers who are building compressor stations on the gas pipeline Urengoy-Tsentr II have especially critical tasks. All 29 of the stations must be put into operation during the second and third quarters of this year. Little time remains, but operations in some places lag behind schedule. This deserves the attention of the management of Minneftegazstroy, Minenergo, Minpromstroy, Mintyazhstroy [Ministry of Construction of Heavy Industry Enterprises] and Minstroy [Ministry of Construction] as well as organizations to which compressor station construction on this pipeline has been entrusted. Workers at the stations should follow the example of construction workers on the route and expand the competition for ahead of schedule completion of projects.

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PIPELINE CONSTRUCTION

PIPELINE SUPPLIES FUEL TO ASHKHABAD

Ashkhabad TURKMENSKAYA ISKRA in Russian 6 Jan 85 p 1

[TurkmenINFORM article: "From the Depths of the Kara Kum Desert"]

[Excerpt] The Turkmen capital Ashkhabad is now assured of a reliable supply of natural fuel. Gas began flowing here from fields in the south of the republic over an almost 300 kilometer reserve pipeline that had come on-line today.

The steel artery has become a reliable back-up for the old pipeline that has been supplying Ashkhabad and its industrial satellite city Bezmein with gas from the Mayskiy, Shatlykskiy and Tedzhenskiy fields since it was laid 17 years ago. Its condition did not permit raising pipe pressure to satisfy the cities' growing demand for fuel. Therefore, the decision was made to lay a reserve gas pipeline parallel to the old one.

Construction of the gas pipeline will be continued this year. The reserve fuel line will be extended to Bezmein, where it will be hooked into the local GRES and a cement plant. Laying the Tedzhen-Ashkhabad-Bezmein gas pipeline promises to supply gas to consumers much more reliably and also to increase the quantity of gas supplied.

Gasification in Turkmenistan is progressing in accordance with the long term plan approved by the government of the republic, in which special attention is directed to resource recovery from small fields. Over the first four years of the five year plan natural fuel has come by pipe to many of the republic's cities and villages: Bayram-Ali, Murgab, Kaakhka and others. At present 95 percent of Turkmenistan's population uses natural and liquified gas.

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PIPELINE CONSTRUCTION

BRIEFS

NEW PIPELINE IN UZBEKISTAN--A new pipeline has been incorporated into the gas pipeline system of Central Asia. It joins the Shurtanskiy field, the largest in Uzbekistan, with the Mubarekskaya Compressor Station. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 5, Jan 85 p 3] 8750

KIEV TO GET SIBERIAN GAS--Kiev and Poltava oblasts--Skilled workmen from the Special Underwater Engineering Operations Administration, No. 11 of the Soyuzpodvodtruboprovodstroy [All-Union Association for Underwater Pipeline Construction] Association are faced with the fact that more than eight kilometers of the Yelets-Kursk-Kiev gas pipeline, now under construction, must be laid in tunnels across the main channel and tributaries of the Dnieper River. The success of their work will depend in large measure on their suppliers and welders from the Ukrtruboprovodstroy [Ukrainian Pipeline Construction Trust] Trust. Welders say that if they had the stock, they would be able to manage 25-30 welding joints per day during the daylight hours. That is more than a kilometer of joined pipe, certainly a substantial amount since the brigade has to deal with pipe that is 1,220 millimeter in diameter. It is bulky and it takes at least a half hour to weld, if the work is done manually. "We have been assigned a section 262 kilometers long," V. Sergiyenko, manager of the Ukrtruboprovodstroy Trust related. "By autumn we must get across ten rivers, cross many highways and railroad tracks about 200 complex service lines." Not long ago a customized operation was completed outside of Kiev--a tunnel stretching almost two kilometers was laid across the main channel of the Dnieper. Now the Special Underwater Engineering Operations Administration No. 11 of the Soyuzpodvodtruboprovodstroy Association is preparing to tackle the tributaries of the ancient Slavutich. The work will have to be done under complicated conditions--the cold snaps occurring currently are not common in these areas. However, the up-tempo rhythm which the gas pipeline construction workers have established has not slowed for a minute. This is understandable; Kiev awaits the Siberian gas. At present, the city is well supplied with gas, but demand for it is continually rising. TETs, GRES and other large enterprises are switching over to gas. [By S. Prokopchuk] [Excerpt] [Moscow TRUD in Russian 17 Feb 85 p 1] 8750

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ENERGY CONSERVATION

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OIL, GAS MINISTRIES MEET ON RESOURCES

Moscow NEFTYANOYE KHOZYAYSTVO in Russian No 2, Feb 85 pp 59-60

[Article by A. I. Yankevich: "Energy Resource Conservation in Minnefteprom, Mingazprom and Minneftegazstroy Enterprises"]

[Text] An interindustry seminar, "Energy Resource Conservation in Minnefteprom [Ministry of the Oil Industry], Mingazprom [Ministry of the Gas Industry] and Minneftegazstroy [Ministry of Construction of Oil and Gas Industry Enterprises] Enterprises," organized by the central and Ukrainian republic boards of the Scientific-Technical Society of the Oil and Gas Industry imeni Academician I. M. Gubkin was held during August 1984 in Kiev. Participating were 56 experts from the energy services of enterprises, production associations and scientific research and planning institutes of Minnefteprom, Mingazprom and Minneftegazstroy.

Seminar participants heard and discussed 22 papers on the status and ways to increase the effectiveness of efforts to improve the efficiency with which fuel and energy resources are utilized in these industries. They analyzed and discussed the prospects for reducing energy costs by upgrading and improving production technologies, cutting power losses during transmission to consumers, introducing new production and power equipment, making fuller use of secondary energy resources and by improving the planning and accounting associated with energy resource consumption.

It was pointed out during the course of the seminar that the enterprises and organizations of these ministries have been engaged in a major effort to economize in their use of electricity, thermal energy, boiler and furnace fuel and light petroleum products. They have been carrying through with their annual programs of organizational and technical measures. During the first half of 1984, for example, the Ministry of the Oil Industry saved 727 million kWh of electricity (as against the plan figure of 686.8 million kWh), 1,681,700 GJ of thermal energy (as compared with a plan target of 1,622,000 GJ) and 67,100 standard-fuel tons of boiler and furnace fuel (as against the 54,100 standard tons called for by the plan); Mingazprom saved 464.4 million kWh of electricity (better than the 300.0 million kWh targeted by the plan), 1,522,100 GJ of thermal energy (as compared with the planned 1,207,900 GJ) and 362,300 tons of standard fuel (as against the 350,000-ton figure specified in the plan).

At the same time, the seminar brought a number of shortcomings to light as well. The effort to make fuller use of our secondary energy resources has yet to yield the hoped for results. Insufficient attention is being given to the development and introduction

of new, less energy-intensive equipment, to the development of energy-saving technologies and to the upgrading and modernization of existing production and energy-producing facilities and equipment. Lower than would be desired has also been the level of productive utilization of electrical, thermal and other equipment (pumps, compressors, boilers, electric motors), a substantial proportion of which is functioning at low levels of efficiency due to improperly scheduled repairs, maintenance and replacement.

There is also no system of monitoring and recording losses of electrical or thermal power in industrial enterprises, cities and villages or of maximum levels of gas, electricity or thermal power consumption. The process of planning and setting power and fuel norms is still not what it should be, and there remain production processes and categories of production for which procedures for computing norms have yet to be developed and progressive, scientifically based specific norms established.

In planning and designing oil- and gas-field facilities, our planning and design institutes are not always adopting the engineering solutions which take account of the energy indicators and the importance of energy-saving technologies.

Following discussions of the papers and speeches, the seminar adopted the following recommendations:

1. Approve the organizational and technical steps to greater economies in fuel and energy resources outlined and approved by Minnefteprom, Mingazprom and Minneftegazstroy.

2. Consider implementation of the organizational and technical measures planned for 1984 and achievement of targets set for economies in electricity, thermal energy, boiler and furnace fuel and light petroleum products as objectives of the utmost importance for organizations and enterprises of these ministries.

3. Undertake the following as the most important steps to this end:
a) improve production technologies; reduce energy consumption in basic production processes (extracting, processing and transporting oil and gas); introduce automated systems and remotely controlled production processes;
b) improve utilization of electricity, thermal energy and boiler and furnace fuel in the process of transporting these resources to consumers; reduce energy losses in electrical and thermal power systems, machines and equipment; adopt and adhere to the most economical modes of operating production facilities and power plants in electric and thermal power supply systems;
c) improve the design of the power and functional systems of construction machinery and equipment; replace outdated, uneconomical equipment and facilities with more up-to-date, energy-efficient models; modernize existing facilities and equipment with improvements in efficiency;
d) take steps to make more efficient use of secondary energy resources (heat from exhaust gas and hot water and air, for example) in production facilities (compressor stations, gas-processing plants, oil-preparation facilities, boiler installations, etc.);
e) improve the planning and norming of fuel and energy resource consumption and establish progressive, scientifically based specific consumption norms for all types of production and production operations.

4. Request Minnefteprom, Mingazprom and Minneftegazstroy:
a) to check and analyze progress which has been achieved toward target economies in fuel and energy resource consumption by enterprises under their jurisdiction and take the steps necessary to insure the achievement of these targets; in analyzing these efforts, to make sure that enterprises, shops, sections, shifts and brigades are informed of target reductions in energy resource consumption and to inform themselves of the status of efforts to establish proper energy consumption norms and accounting procedures, to implement organizational and technical measures and to identify new ways to conserve energy in all spheres of enterprise operation.
b) to have industry and regional institutes complete work during 1984 and 1985 on the development of integrated, target-oriented programs of basic scientific and technical fuel- and energy-saving measures for the period 1986-1990 and the establishment of consumption norms for the various categories of operations and products, particularly for energy-intensive production operations (producing, processing and transporting oil and gas, for example);
c) to see that their organizations and enterprises participate actively in socialist competition, all-Union public review competitions for most efficient utilization of raw materials and fuel and energy resources and contests for the best suggestions for ways to save thermal energy and electricity;
d) to ask USSR Gosplan and the Central Statistical Administration to review the procedure currently employed to compute the target figure for average reduction of fuel and energy consumption norms to the level of the base year with a view to simplifying this procedure;
e) to include the chief power engineers of production associations in the fields of oil and gas production, processing and transportation in the categories of workers rewarded for economies achieved in the consumption of material, fuel and energy per unit of commodity production;
f) to accelerate production of pumps with polymer-coated working components and of pumps used to inject water into oil-bearing formations;
g) to task industry institutes with the development of recommendations for the compensation of reactive power (energy) at oil and gas production and transport facilities and of compensating equipment;
h) to task industry institutes with the development of a regulation to govern the organization of planning and record-keeping in connection with efforts to monitor progress in the implementation of energy-saving measures;
i) to take the recommendations of this seminar into account in developing organizational and technical measures for 1985.

5. Request Minnefteprom:
a) to task VNIIOENG [All-Union Scientific Research Institute of Oil and Gas Industry Economics and Management Organization] with the development of an organizational structure for enterprise thermal engineering services taking account of boiler and furnace fuel consumption and thermal energy production by boiler facilities and oil heating furnaces;
b) to instruct Uprkomplektoborudovaniye to equip electrical centrifugal pumping facilities with the KTPPN-82 control stations only;
c) to instruct the Automation Administration together with the Primary Power Engineering Administration and the Soyuztermneft' all-Union scientific-production association to develop and introduce an automated system of accounting and collecting and processing statistical data on fuel and energy consumption through Minnefteprom's main information and computation center;

d) to continue the practice of defending the annual drafts of fuel and energy consumption norms for the planning period in NIPITermneft';
e) task its planning and design institutes and association power services with analyzing the possibility of using the more economical 10 kV to run the deep-well pumps at new oil-production sites and determining whether it would be practically possible and economically advantageous to change the mechanized stock of wells in the older oil-producing areas from 6 kV over to 10 kV;
f) to task scientific research institutes and oil-production administrations with analyzing the effectiveness of the process of injecting water into oil-bearing formations and of the use of electricity to run PPD in the oil fields and with the development of a program of measures to eliminate unproductive use of electricity for these purposes.
g) to ask the Ministry of the Electrical Equipment Industry to accelerate production of the SDB synchronous electric motors for pumping units and to arrange for them to undergo their industrial testing under actual oil-field conditions;
h) to instruct the Soyuztermneft' all-Union scientific-production association to complete work on the collection of methods of computing fuel- and energy-consumption norms in 1985;
i) to organize socialist competition for the best enterprise in the industry in terms of efficiency of energy utilization with prizes and money awards.

6. Request the central board of the oil and gas industry's Scientific-Technical Society imeni I. M. Gubkin:
a) to task the power-engineering sections of the oil and gas industry's scientific-technical society together with the power-engineering section of the agriculture scientific-technical society with the development of proposals for the use of secondary energy resources generated by Mingazprom and Minnefteprom enterprises in agriculture;
b) to recommend to the power-engineering sections of the republic, kray and oblast boards and the councils of primary organizations of the gas and oil industry scientific-technical society to assist enterprises in analyzing the facilities and equipment they are now employing with a view to determining the advantage to be gained by continued operation of them.

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GENERAL

UKRAINE'S ENERGY MINISTER SKLYAROV ON POWER PROGRAM

Kiev RADYANS'KA UKRAYINA in Ukrainian 22 Dec 84 p 2

[Article by V. Skliarov, minister of Energy and Electrification of the Ukrainian SSR: "The Electric Glow of the Republic : Today Is Power Worker's Day"]

[Text] By means of the selfless work of the Soviet people a powerful fuel-energy complex was created in our country. USSR is the only large industrially developed country which is completely self-sufficient in terms of fuel and energy, due to its own natural resources, and it exports fuel and electrical energy on a significant scale.

Power engineering is the basic part of this fuel-energy complex; it represents a decisive influence on the rate of development of the entire domestic economy and speed up the scientific-technological progress. In the energy complex of the union, one of the leading places is occupied by the energy of Soviet Ukraine. In order to give an idea of its volume, it would be enough to mention this fact: the established capacity of the energy system of the republic is greater by a factor of 82 than the initial capacity of Dniproges [Onieper Hydroelectric Power Station] imeni V.I Lenin. The output of electrical energy will reach 257 billion kilowatt-hours this year.

Insofar as the course of USSR's Energy Program for creating a large-scale high-productivity nuclear energy on the territory of the UkrSSR is concerned, four nuclear stations are already operating, including the first Soviet large industrial atomic thermal power generating center being built near Odessa. Thanks to the AES, at the beginning of the five-year plan over 30 million tons of fossil fuel were saved. In the development of Ukraine's electrical energy, such is the beginning of a new period in terms of the output quality. The continuation of this program has been set by law by the UkrSSR Supreme Soviet at the 10th Session; in the final year, the production of nuclear-generated electric power is to grow by 4.7 percent. Also, a very active policy is being implemented to save energy; today it is one of the main directions for scientific-technical progress in using energy resources, and especially the republic goal-oriented Energy Complex Program. Besides the intensive development of atomic energy, the main efforts of the plan anticipate an increase in the combined production of thermal and electrical energy, and the centralization of heat supply.

The Ukrainian SSR was one of the first to introduce steam and hot water for heating of industrial and residential facilities. The total set capacity of the TETs [thermal electric power station] today is over 6 million kilowatts.

Residential heating capacities are being developed; operating thermal electric power plants are being expanded and new ones are being built. Thus, at each of Kiev's TETs-5 and TETs-6, two residential heating power blocks of 250 megawatts each were built. It is planned to speed-up the introduction of high productivity of the Kharkiv TETs-5 and the Lviv TETs-2, and the reconstruction of a entire series of electric power plant blocks to provide thermal energy to cities in the UkrSSR with a population over 100,000 people. This will allow to free up more than 700,000 tons of fuel, and to raise the production of electrical energy for the residential heating cycle to 11 percent.

In accordance with the Energy Complex Program, electric power lines are being built at a rapid rate. At the beginning of the Five-Year Plan over 79,000 kilometers of new overhead transmission power lines were put in. An entire system of scientific, technical and organizational efforts were carried out in order to reduce the cost of transporting electrical energy, which represents over 1.5 billion kilowatt-hours.

The main task of the branch is to supply the domestic economy with electrical and thermal energy with no interruptions--and this is possible only on the basis of securing reliability in the installation work. During the physical aging of the facilities, this problem becomes especially urgent. Through the joint efforts of scientists from the Academy of Sciences of the Ukrainian SSR, and Ministry of Higher Education of the Ukrainian SSR and the Ministry of Energy of the republic, a series of programs were developed for this purpose, the accomplishment of which in essence indicates a technical requirement. We are focused in this direction by the decisions of the 26th Party Congress, and the program's positions and resolutions, as expressed in the speeches of Comrade K. U. Chernenko, General Secretary of CPSU Central Committee, at the October (1984) Plenum of the Central Committee and the recent meeting of the Politburo of the CPSU Central Committee. That is why the direction for raising the technical level of production is more goal-oriented towards the utilization of scientific and technological achievements and this has become the specific work plan for all energy enterprises and all workers.

We plan to improve the economic indexes of our work primarily by means of reducing the specific fuel expenditures per one kilowatt-hour of produced electrical energy. Here the branch has taken a course towards the utilization of highly economical power units, the introduction of automated control systems for technological processes for the production of electrical power, and the selection of rational operating conditions for the facilities, their modernization, etc. For example, the reconstruction of 38 energy units, which has been carried out during the current five-year plan, has given us the opportunity to lower this index by 1.5 grams per one kilowatt-hour. This represents a savings of approximately 300,000 tons of fuel, which could then be used to operate such large thermal electrical plants as the Zaporozhye and Uglegors k.

There is another, though no less important, reserve for improving the reliability of electrical plant operation: that is the application of a proper

operating regimen for the utilization of low quality coal. The operation of a plant using fuel of such quality is obviously becoming complicated year by year. Under such conditions, the power specialists of the republic are searching for ways to utilize the so-called plentiful types of fuel. If a series of problems were resolved, then the important matter of improving the effectiveness of low quality fuel utilization would move much faster. It would be especially useful to build new beneficiation plants and reconstruct the operating plants, which would produce the desired type of fuel to provide the power specialist with the opportunity to achieve maximal output and to utilize economically the TES facilities.

Besides that, the policy for energy conservation demands an acceleration of efforts which produce new equipment for maneuvering power blocks that run on the same low quality coal. There are plans to bring on line such power aggregates with a total power of 2 million kilowatts, in the next decade at the Dobrotvors'ka, Shterivs'ka, Myronivs'ka and Kharkiv DRES.

One of the methods for utilizing low quality coal is gasification; the Institute of Electrodynamics of the Academy of Sciences of the Ukrainian SSR is working on developing methods to achieve this. The first research-industrial gasification facility is being built at the Myronivs'ka DRES.

The utilization of wastes from energy production provides significant economic gain from ash slag mixture, dry ash, and vanadium-nickel type effluents. The separation of granular ferro-silicon from liquid slag is highly promising. A successful experiment was carried out at the Starobeshivs'ka DRES. This technology, developed by the Academy of Science of the UkrSSR's Institute of Casting, the UkrSSR Ministry of Energy and the Azovstal' [steel] Factory, will be introduced at five electric plants of the branch, and this will result in the production of at least 20,000 tons of valuable metal a year, with a saving of up to one million rubles. Parallel to this, the problem protecting the environment is also being solved.

Other assets in economic reserves are a reduction in network losses, an improvement of the quality of electrical energy and the maintenance of tension wires. For the replenishment of the republic's energy, new maintenance techniques are being used by power workers as one of the primary means to raise the reliability of power production for the state. Due to the decrease of electrical energy losses, 174.8 million kwh were saved during this year. Naturally, in view of the fact that it is not an easy matter, in the final year of the five-year plan, to fulfill almost 60 percent of additional demands in the domestic economy in terms of fuel energy resources and rolled ferrous metals, we are planning this important work in such a way that knowledgeable and responsible utilization of raw materials, equipment and electrical energy will be an everyday concern of power workers.

This is how the collective of the Trypillya DRES is working; it has taken upon itself a socialist obligation to create an economized [fuel] fund, and to operate two days on the saved fuel. The Zaporozhye DRES imeni the 25th Congress of the CPSU, which works under the slogan "For the 11th Five-Year Plan--the Highest Economy at the Minimal Costs", produces the most economical electrical energy among all the thermal power plants today.

Especially notable in this area is the output of the creative brigades, rationalizers, inventors and workers-innovators. Among them is the 1984 laureate of the USSR State Prize, C. M. Protsyshyn, senior machinist of the Ladyzhyns'ka DRES imeni the 50th Anniversary of the USSR. His personal contribution to the five-year plan represents 11 innovative proposals in the area of saving energy resources, with a savings effect of over 9,000 rubles. Rational management, and economizing in large and small matters is the most important task of the right-flank workers of the five-year plan, who were placed in the Labor Hall of Fame at UkrSSr Exhibit of the Achievements of National Economy: Yu. V. Bendus, senior machinist, Zaporozhye DRES, O. S. Lohvynov, machinist at the Rovno Nuclear Electric Power Plant imeni the 60th Anniversary of the USSR; V. Konovalenko, electrical mechanic, Ternopil electrical enterprise of the Vinnytsyaenerho Association and S. I. Hulov, senior machinist, Starobeshivs'ka DRES imeni V. I. Lenin.

The main task of the day and the direction for the future is to follow their example, to increase one's own achievements in fulfilling their exalted responsibilities in honor of the 40th anniversary of Victory, and to greet in a worthy fashion the 27th Congress of CPSU.

12868
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GENERAL

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INTEGRATED ASSEMBLY-TO-INSTALLATION PROCESS LAUDED

Moscow EKONOMIKA STROITEL'STVA in Russian No 10, Oct 84 pp 3-7

[Article by Deputy Minister of Construction of Petroleum and Gas Industry Enterprises G. I. Shmal': "The Completely Unitized Method for Organizing Construction for Oil and Gas Industry Projects", under the rubric "To Improve the Planning, Organization and Administration of Capital Construction"]

[Text] The completely unitized method of organizing construction has become solidly entrenched in the practice of constructing oil and gas industry facilities, and is finding ever-wider acceptance in the country. It has come about as the result of a search for fundamentally new ways of handling increasing volumes of construction and installation work in the uninhabitable hard-to-reach regions of Western Siberia, with their extreme natural and climatic conditions.

The essence of the completely unitized method consists in organizing the construction of facilities through the use of products which are in a state of high plant readiness. These products come grouped according to purpose, in boxes, consolidated installation assemblies, components and quick-assembly structures, and are delivered to the construction site in full sets, ready to be connected to supply lines, and for testing and operation.

This can be represented schematically, as follows: the structures, equipment and materials arrive at the procurement and assembly enterprises in the storage-center towns. This is where the equipment is fitted into grouped modules, the technological connections are made, the wiring is completed, the roof and side panels are installed, and the equipment is inspected and pressure tested. Then the grouped modules are delivered to the installation area where the equipment is installed.

Thus, a considerable volume (50-55 percent, and more at times) of construction and assembly work is done in the plant rather than at the construction site. This increases labor productivity, since many of the preliminary operations are carried out on in-plant equipment, automatic and semiautomatic welders are used, and the work-places are equipped with a broad range of equipment. Consequently, and what has an even greater effect, assembly, and particularly welding work, can be done regardless of climatic conditions, so the quality of the assembly, even of the entire construction process is enhanced, problems

of making up order assortments are resolved in improved fashion, and the volume of freight shipped to northern regions and directly to the erection sites is reduced. The last item is particularly important, since one of the primary factors relating to the overall increase in construction costs, especially in the North, is the high cost of transport.

The completely unitized process of organizing construction also presupposes the delivery of complete sets of structures and materials to the erection site, and the provision of the construction sites with mechanisms and machines in compliance with POS's [possibly construction plan], POR's [plan for the organization of operations], and PPR's [work production plan] and the table of technical equipment. By organizing construction along the lines of the completely unitized method, it becomes possible to combine the operations for deriving the zero-cycle and for installing basic equipment, since the latter is done at the plants; to eliminate the need for setting up a construction base for every project (the bases can and must be located in the cities, where living conditions are better); and to enhance the construction organizations' mobility.

By using this method to organize construction, social problems are resolved in a totally unique way. A large number of workers work in plants in habitable cities, where housing construction is a simple affair, and a definite social infrastructure already exists. The example of the Sibkomplektmontazh [Siberian Association for the Installation of Equipment in Complete Sets] shows that social problems find better solution by this method, which also leads to consolidation of the work force.

New technical resolutions and progressive methods of organizing construction work also have a considerable effect on the organizational structure which is supposed to provide mobility, a high level of centralization, and the capability of concentrating the work force at the necessary projects, as well as on flexibility in problem-solving, and the concern of all those taking part in construction in achieving high national economic results at the lowest cost.

This structure was developed by Sibkomplektmontazh, and is made up of the plants which comprise the construction balance, the supply and procurement organizations which deliver materials and block-boxes to the erection sites, the transport subdivisions, the PMMK [not further expanded], a special planning and design bureau, the Orgtekhstroy Trust [State Trust for Industrial Construction], subdivision supply-dispatching offices etc. Plants and PMMK's are not entitled to the same rights as a socialist state production enterprise. In a case such as this, a double-link administrative system emerges: ministry plus association.

Concentrating the problems of making up complete equipment sets, problems of transport and of material and technical supply in the hands of a small number of people brings more efficiency into resource utilization, and allows these people to maneuver the resources and to manufacture the auxiliary structures in plants, which permits more economical expentiture of materials.

The Sibkomplektmontazh Association is a radically new type of organization. In fact, it is the first industrial construction association whose production conveyer was completed at the construction site, and turned over as a finished item, ready for operation.

The association has found and implemented effective forms of work organization, aimed at speeding up construction, and at creating conditions in which mobile production units (columns and brigades) are able to function autonomously at any distance from the production bases, and can carry out the entire cycle of installation operations by using the dispatched duty-shift system. Comparison of the basic technical and economic indicators of the work of the association and the construction and installation organizations which are erecting the oil and gas field surface facilities in the Tyumen Oblast has shown that the completely unitized method requires 20-30 percent fewer supervisory personnel and 30-40 percent of the total work force to complete an identical volume of construction-installation work.

Volumes at which the completely unitized method has been introduced into Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises] have increased at sufficiently high rates. Yearly volumes of work done using this method exceeded R800 million in 1983, and have increased 6-fold relative to 1975.

There are plans this year to assimilate about a billion rubles by using this effective method. This accounts for about 50 percent of the total volume of work on surface production facilities. The volume of work done by this method will far exceed one billion rubles by the end of the 11th Five-Year Plan period and will equal about 20 percent of the volume of work completed by in-house workers.

In a brief span of time, about seven years, a production and economic complex has been organized within Minneftegazstroy to carry out construction of surface facilities by the completely unitized method. This complex is made up of eight mobile trusts with their own enterprises for the assembly and completion of sets of equipment, the experimental Sibkomplektmontazh Production Association, enterprises of the Soyuzneftegazstroykonstruktsiya [All-Union Association for the Construction of Oil and Gas Field Structures] Association, and a number of scientific research, and planning and design organizations. The complex employs over 70,000 people at present.

Working closely with planning institutes from Mingazprom [Ministry of the Gas Industry], Minnefteprom [Ministry of the Petroleum Industry] and USSR Gosstroy, this ministry's planning organizations have completed a major planning effort in designing modular and module-grouped equipment arrangements. At the present time there are over 400 types of structures which make up oil and gas industry surface facilities which also include facilities used by construction workers, and which are erected using the complete modular group method. Practically all the oil and gas workers' production facilities, except for the large-span industrial buildings, settling-tank reservoirs for high-capacity purification installations, and certain others, are designed in blocks and interconnected units.

Among the plant-produced items are water boiler houses equipped with two BVK and two BVKM boilers, a steam boiler house with DE boilers, pumping stations, expanded potential purification plants, transformer substations and deferrization installations.

What exactly have been the basic technical and economic results of using the completely unitized construction method within Minneftegazstroy?

In the first place, construction time has been reduced 2-3-fold. This is the main constituent of this method's effectiveness. As an example, we can turn to the data on the actual construction time of oil and gas industry facilities built using the complete modular set method in comparison with the standard amount of time spent in the construction of traditional facilities, as stipulated in SN- [Construction Norms]-440-79, and shown in the Table:

	(A) Наименование объектов	(B) Продолжительность строительства, мес	
		(B1) традиционный вариант (СН 440-79)	(B2) комплектно-блочный вариант
1	Установка комплексной подготовки газа на газоконденсатном месторождении мощностью 10 млрд. м³/год (фактически 20 млрд. м³/год)	22	7—8
2	Газовая компрессорная станция мощностью 50 тыс. кВт	21	8—10
3	Кустовая насосная станция по добыче нефти производительностью до 20 тыс. м³/сут.	10	5—6
4	Нефтеперекачивающая станция мощностью 12,5 тыс. м³/ч	22	9—10
5	Дожимная насосная станция по нефти мощностью 30 тыс. м³/сут	9	3—4
6	Очистные сооружения канализации производительностью 15 тыс м³/сут	17	9—12
7	Котельная водогрейная производительностью 3,6 Гкал	4	0,2—0,3
8	Котельная ДЕ 25/14 ГМ паропроизводительностью 75 т/ч	12	3—4

Key: (A)--Description of facility; (B)--Construction time, months; (B)--Traditional method (SN-440-79); (B2)--Completely unitized method; 1--Comprehensive gas treatment installation in a gas-condensate field with a 10 billion m^3/year capacity (actual capacity: 20 billion m^3/year); 2--Gas compressor station, 50,000 kilowatt capacity; 3--Oil recovery cluster pumping station, 20,000 m^3 daily pumping capacity; 4--Oil pumping-over station, 12,500 m^3/hour pumping capacity; 5--Oil pressure-equalizing station, 30,000 m^3 daily capacity; 6--Sewage purification plant, 15,000 m^3 daily capacity; 7--Water-heating boiler house, 3.6 hectocalories; 8--DE 25/14 GM boiler house, 75 ton/hour steam output.

It should be mentioned that these indicators do not reflect the full extent to which construction time can be reduced. It can be further reduced through the organization of flow-line construction with specialized integrated brigades, and by providing these brigades with power tools and accessories for installation and finishing work on the equipment blocks.

In the second place, the overall labor productivity has increased 3-fold, both in the plant and at the construction site. For example, if, during the initial years of construction in the Western Siberian fields, the output per worker in the Sibkomplektmontazh Association was six to seven thousand rubles per year, output in 1983 increased to 25,300 rubles.

As the calculations show, when labor outlays are appreciably reduced for above-ground construction as a result of widespread implementation of the completely unitized method of organizing construction, and general construction operations are replaced by installation operations, then a facility can be erected by the work force of a single consolidated brigade of 45-50 persons.

In the third place, the production cost for construction and installation work has been reduced by 18-20 percent for the following reasons: reductions in metal used per facility (up to 30 percent), reductions in the total work force by 15-20 percent (the number of those working at the construction site was reduced by 40-50 percent).

At the same time it should be mentioned that the blocks, being made of hard-to find materials, are still expensive. Reducing their cost presents a pressing problem, a solution to which is being sought by the ministry.

Fourth, the estimated costs of oil and gas facilities has witnessed an average reduction of 20 percent, and this is due, for the most part, to the factors which have reduced the production cost for construction and installation work.

The most prominent factors effecting the further development of the completely unitized method are the increase in the level to which planning resolutions have been industrialized (25 percent), the provision of complete equipment deliveries (over 30 percent), and specialization in the construction and installation organizations (over 17 percent).

The high level of industrialization in construction via the completely unitized method has created conditions for the high-speed erection of major oil and gas industry facilities with the construction workers remaining only briefly at the erection sites, and using the dispatched duty-shift form of labor organization. This is of prime importance, since it is much more costly per man in northern regions than in the central belt.

The widespread implementation and constant improvement of the completely unitized method of organizing construction has made it possible for the ministry to work out successful solutions to the tasks set by the party and the government for the 10th and 11th Five-Year Plans for increasing capacities for the recovery and transport of oil and gas, and for providing the national economy with hydrocarbon raw materials and fuel. We believe that realization of the country's Power Production Program during the 12th Five-Year Plan period and the years thereafter, with regard to oil and gas recovery levels, requires maximum possible use of the completely unitized method. This is the period during which construction of new oil and gas fields will be carried out in the most recently developed, extremely hard-to-reach areas. Naturally, construction will have to be fast-paced in these unfavorable and challenging

conditions, and will have to be carried out by the least possible number of workers being brought in. This, in turn, is only made possible by utilizing the highest possible degree of industrialization, by transferring the greatest possible volume of work to the plants, and through widespread use of modules and the modular incorporation of equipment at the facilities under construction.

In 1979, for the purpose of finding quicker and more favorable solutions to the intersectoral problems of introducing the completely unitized construction method, USSR Gosstroy, GKNT [State Committee on Science and Technology] and USSR Gosplan worked out the "Interdepartmental Special-Purpose Scientific and Technical, and Production and Technological Program for the Further (up to 1985) Development of the Completely Unitized Method of Construction." All the tasks assigned in accordance with this program have been carried out by Minneftegazstroy.

And meanwhile, the following problems are on the ministry's agenda:

to develop, in collaboration with USSR Gosstroy, a schedule of measures by which to organize an industrial base for completely unitized construction, having made provision for the development and enlargement of production of efficient thermal insulating materials, as well as new forms of construction materials;

to work toward the standardization of design resolutions for blocks and for modular incorporation equipment for the purpose of bringing about an appreciable reduction in the number of these products, and to review the list of standard and repeatedly-used plans which are still used for oil and gas industry facilities;

to expand the use of the completely unitized method in the plans for gas distribution stations, which are being worked out by USSR Gosstroy institutes, and other departments and ministries, as well as plans for motor vehicle compressed gas tank-filling stations and other facilities;

to develop a procedure for setting prices for completely unitized construction;

to introduce appropriate changes in the planning norms for operative Construction Standards and Regulations for surface facilities and structures, which it is technically possible to erect using the completely unitized method of construction.

12659
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SOYUZNEFTEMASH ALLEGED RESPONSIBLE FOR DERAILMENT

Baku VYSHKA in Russian 16 Mar 85 p 2

[Article by G. Mamedov, Kishla Station Director, "How Arguments are Started"]

[Text] "We, the undersigned, having written this report, do hereby depose and declare that on March 1, four cars derailed on the siding to the Khimreaktiv offices...."

Accidents like this one happen frequently on this siding. But on the report, the Inter-Republic Industrial Chemical Sales Office always blames the Soyuzneftemash All-Union Production Association for the accident.

This is the reason: in the past, only the Khimreaktiv offices used the siding, which branches off at the station. However, when the machine builders built their finished-product plant near Khimreaktiv's offices, they also began using the siding. The traffic load increased tens of times: Khimreaktiv received 10 to 15 cars a month, but Soyuzneftemash gets 700 to 750 cars.

Common sense says that the party receiving the most traffic, i.e., the machine builders, should be most interested in maintaining the siding in good condition. But whenever the subject is raised, Soyuzneftemash managers become intractable. They have a single, ready-made reply every time: "It is not our siding."

I want to point out the moral groundlessness of that position: insisting on the point of the technical ownership of the siding, the machine builders are carrying on a dispute with a small office which is many times smaller financially and equipment-wise than their association. They know that the siding, which is not being maintained at all, was primarily worn out by their heavy rail traffic. They know, but they continue to argue.

A few years back, Khimreaktiv broached the question about transferring the entire siding to Soyuzneftemash. Correspondence on the subject fills an entire book, but the matter did not move forward so much as a millimeter, in spite of the fact that the machine builders themselves suffered more than the other users of the siding, Khimreaktiv and a bread combine of the Ministry of the Food Industry.

And it is costing them dearly. More than the cost of repairing the siding. After the loaded car derailed, the delivery of other cars to the machine building plant was suspended. Last Saturday, 15 cars came in loaded with metal, pipe and equipment for the Baku Worker, Lenin, Petrov, Kirov and Kasimov plants. These are the items needed for the normal operation of these enterprises. But they could not be delivered and unloaded, because the derailed car was blocking the line.

Soyuzneftemash Assistant Manager A. Sidoruk and directors from the other plants met at the Kishla station to discuss what to do with the waiting cars. What indeed? They would have to unload the cars themselves. The alternative was to get the derailed car back onto the rails faster. And that is not an easy matter: a work train would have to be ordered.

They ordered the train, rerailed the car, and shortly afterward, a car derailed on an adjoining track. Traffic had to be suspended on both tracks. Finally, the machine builders were forced to unload some of the cars on our tracks.

We went to Soyuzneftemash's plant. There were mountains of finished products and pig iron products awaiting shipment to customers, mostly oilfield enterprises, under contractual delivery terms. They are sitting there until the line is cleared. As of today, the Soyuzneftemash All-Union Production Association is 124 cars behind in production.

Consequently, due to the improvidence of the association's managers, production is suffering and oilfield workers in Tyumen', Tatariya, Bashkiriya and other areas are not receiving ordered oilfield equipment on time. So the machine builders are creating difficulties for themselves. If they would add up the fines they have paid the railroad for idled cars for the current five-year plan alone, perhaps they would understand that the total would be not only enough to maintain the siding, but to build a new one also.

8844
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GENERAL

TURBODRILL FOR SUPERDEEP DRILLING DESCRIBED

Moscow EKONOMICHESKAYA GAZETA in Russian No 7, Feb 85 p 16

[Article by M. Semenov, "Turbodrill for Superdeep Wells," under the rubric, "Made in the USSR"]

[Text] Soviet scientists have delved deeper than anyone else in the world into the secret storehouses of our planet, not only in a figurative sense, but literally. This was made possible with the drilling of the Kol'skaya Well, which is now below 12 km in depth. As a result, unique data have been obtained which will make it possible to identify and better utilize potential underground resources.

The "inner-space" trailblazers have achieved record performance indicators and are continuing to improve these indicators using modern Soviet-made equipment. The TRM-195 reduction gear, developed at the All-Union Scientic-Technical Research Institute for Drilling Technology, has no equivalent in world industry. It works with no failures at downhole temperatures up to 480° Kelvin, and a high-temperature model operates at even higher temperatures.

The modular method basically underlies its design. The TRM-195 consists of three parts: a turbine, reduction gear and a shaft. All connections are threaded. The turbodrill's highly rugged design allows its configuration with one or more turbine sections, one or two reduction gears and a core barrel, as needed.

The reduction gear has an original design. Its double-toothed planetary gear with spiral engagement is capable of transmitting torque loads up to 10,000 N-m. The design of the transmission, which is not affected by bit load variations, is of great significance. Its operating time to failure greatly exceeds that of other turbodrills.

Of course, the TRM-195 has proved itself not only under the extreme conditions of superdeep drilling. Tests have shown its high efficiency in sinking oil, gas and geothermal wells on land as well as offshore.

Technical designs utilized in the turbodrill have been patented in the USA, Great Britain, Canada, France, the Federal Republic of Germany, Japan and other countries.

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CSO: 1822/210

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